APPENDIX B
PHASE 2 FIELD SAMPLING AND ANALYSIS PLAN – VOLUME 2

FINAL
PHASE 2 FIELD SAMPLING AND ANALYSIS PLAN – VOLUME 2

REMEDIAL INVESTIGATION/FEASIBILITY STUDY, NEWTOWN CREEK

Prepared by

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(Please note that although numerous Standard Operating Procedures are applicable to both volumes of the Phase 2 Field Sampling and Analysis Plan, they are primarily housed in one document [indicated in the following list] for version control.)

LIST OF ACRONYMS AND ABBREVIATIONS

µm	micrometer
°C	degrees Celsius
csv	comma-separated values
ADCP	acoustic Doppler current profiler
ADV	acoustic Doppler velocimeter
Anchor QEA	Anchor QEA, LLC
cm	centimeter
COC	chain-of-custody
CSO	combined sewer overflow
DAR	*Data Applicability Report*
DGPS	differential global positioning system
DMP Addendum No. 1	*Data Management Plan Addendum No. 1*
DO	dissolved oxygen
FS	Feasibility Study
GIS	geographic information system
GPS	global positioning system
H_2S	hydrogen sulfide
ID	identification
IDW	investigation-derived waste
mL	milliliter
MS4	municipal separate storm sewer system
NAD83	North American Datum of 1983
NAPL	nonaqueous phase liquid
NCG	Newtown Creek Group
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYLI	New York Long Island
NYSDEC	New York State Department of Environmental Conservation
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl

Phase 2 FSAP Volume 1	*Phase 2 Field Sampling and Analysis Plan – Volume 1*
Phase 2 FSAP Volume 2	*Phase 2 Field Sampling and Analysis Plan – Volume 2*
Phase 2 HASP	*Phase 2 Health and Safety Plan*
Phase 2 QAPP	*Phase 2 Quality Assurance Project Plan*
Phase 2 RI Work Plan Volume 1	*Phase 2 Remedial Investigation Work Plan – Volume 1*
Phase 2 RI Work Plan Volume 2	*Phase 2 Remedial Investigation Work Plan – Volume 2*
PID	photoionization detector
POSO	Project On-site Safety Officer
PPE	personal protective equipment
propwash	propeller wash
QA	quality assurance
QC	quality control
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SCUBA	self-contained underwater breathing apparatus
SOP	Standard Operating Procedure
SPDES	State Pollutant Discharge Elimination System
SSAM	*Sources Sampling Approach Memorandum*
TOC	total organic carbon
TSS	total suspended solids
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
WPCP	Water Pollution Control Plant
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

This section is provided in the Phase 2 FSAP Volume 1.

2 ORGANIZATION AND RESPONSIBILITIES

This section is provided in the Phase 2 FSAP Volume 1.

3 MOBILIZATION ACTIVITIES

This section is provided in the Phase 2 FSAP Volume 1.

4 WATER (VOLUME 1)

This section is provided in the Phase 2 FSAP Volume 1.

5 SEDIMENT (VOLUME 1)

This section is provided in the Phase 2 FSAP Volume 1.

6 TISSUE (VOLUME 1)

This section is provided in the Phase 2 FSAP Volume 1.

7 SURVEYS (VOLUME 1)

This section is provided in the Phase 2 FSAP Volume 1.

This version of the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2) includes updates to the point source discharges portion (Section 10) based on discussions with the U.S. Environmental Protection Agency (USEPA) following the approval of the water (Section 8) and sediment (Section 9) sections of the June 2014 document. Any deviations to those portions of the Phase 2 FSAP have not been updated in this November 2014 version but are available in Deviation Memorandum Nos. 2 through 5 and any future memoranda.

8 WATER (VOLUME 2)

The Phase 2 Remedial Investigation (RI) Volume 2 field program will include surface water sampling (described in Section 8.1), continuous surface water quality monitoring (described in Section 8.2), the current meter deployment program (described in Section 8.3), and groundwater sampling (described in the *Phase 2 Remedial Investigation Work Plan – Volume 2* [Phase 2 RI Work Plan Volume 2; Anchor QEA 2014c] Appendix F; the Phase 2 FSAP Volume 2 Addendum; and *Phase 2 Quality Assurance Project Plan* [Phase 2 QAPP; Anchor QEA 2014d] Version No. 3 that are currently in progress) in the Study Area. All of the tasks described in this section will be documented, and the documentation will be stored in the project files as described in the *Data Management Plan Addendum No. 1* (DMP Addendum No. 1; see Appendix D of the *Phase 2 Remedial Investigation Work Plan – Volume 1* [Phase 2 RI Work Plan Volume 1; Anchor QEA 2014a] and the Phase 2 RI Work Plan Volume 2).

8.1 Surface Water

This section describes the procedures that will be followed to perform the surface water sampling activities in the Study Area in support of modeling. Water column monitoring activities will take place for modeling data needs and include water column sampling conducted during point source discharge events, dry-weather total suspended solids (TSS) sampling, and water column sampling collected in the East River and mouth of Newtown Creek during flood tides.

A summary of the analytical surface water stations, field activities, sample identifications (IDs), sampling methods, and chemical analyses to be performed is provided in Table B8-1.

A summary of the analyses, minimum sample requirements, containers, and laboratory information is provided in Table B8-2.

Surface water sampling activities may be conducted using different equipment and/or during separate mobilizations. The scope development is described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volume 1 [Anchor QEA 2014a] and Phase 2 RI Work Plan Volume 2 [Anchor QEA 2014c]).

8.1.1 Overview

The following sections present a summary of the surface water sampling program including the purpose and summary of work to be completed during Phase 2.

Purpose. Surface water sampling will be conducted in the Study Area and East River to meet the following objectives:

1. Provide a better understanding of temporal and spatial patterns in the surface water quality and chemistry in the Study Area during point source discharge events to support model calibration.
2. Develop a TSS and turbidity relationship using collocated surface water TSS data and sonde water column turbidity data collected over five wet-weather and two dry-weather events.
3. Provide surface water chemistry data in the vicinity of the large combined sewer overflows (CSOs) to help further characterize CSO loads and understand the fate of such loads in the creek.
4. Characterize suspended sediment and chemical loadings entering Newtown Creek from the East River to support development of boundary conditions for the sediment transport and chemical fate and transport models.

Summary of Work to be Performed during Phase 2. The objectives outlined in the Phase 2 RI Work Plan Volume 2 will be addressed by conducting additional surface water sampling and related analysis in the Study Area and East River.

Surface water sampling programs include the following:

- **Surface Water Sampling during Point Source Discharge Events** – Conduct surface water sampling and water column profiling targeting wet-weather conditions.
- **East River Surface Water Sampling** – Conduct surface water sampling in the East River and the mouth of Newtown Creek during flood tide conditions.
- **Surface Water TSS Concentration Sampling** – Conduct surface water sampling and water column profiling of TSS concentrations during dry-weather conditions.

The number of surface water samples and the location of surface water stations may be modified based on field conditions. These stations may be adjusted based on the results of the identification of potential utilities or other hazards within the Study Area and/or field conditions. If a station needs to be moved more than 200 feet parallel to the shoreline and/or 50 feet perpendicular to the shoreline, USEPA will be notified prior to sampling. A log of the rationale for significantly moving any station will be maintained and included in monthly status reports to USEPA.

A summary of each of the surface water sampling programs is provided in the following sections.

8.1.1.1 Surface Water Sampling during Point Source Discharge Events

Phase 2 wet-weather surface water sampling will be conducted at 18 locations in Newtown Creek as presented on Figure B8-1a and as follows:

- Eleven of these locations are located in the center of the channel and will be submitted for chemical and TSS concentration analysis. The locations are as follows:
  - Six of these locations are co-located with center channel sonde locations (see Section 8.2).
  - Surface water samples will be collected from one location at the upstream end of each of the four tributaries (i.e., English Kills, East Branch, Maspeth Creek, and Dutch Kills).
  - One location immediately downstream of the mouth of Dutch Kills will be sampled.

- The remaining seven locations correspond to the locations at which sondes will be deployed (see Section 8.2) for continuous monitoring and dry-weather TSS concentration samples will be collected (six shoreline locations and one location center channel of the Turning Basin); the objective of sampling these seven locations is to collect data that can be used to develop a relationship between measured TSS concentrations and turbidity. Therefore, samples collected at these locations will be submitted for TSS concentration analysis only.

Samples will be collected up to two times, from two depths—one near the surface (approximately 3 feet from the water surface) and one near the bottom (approximately 2 to 3 feet above the mudline)—during five separate point source discharge events. If more than two distinct water types are observed, a third sample may be collected from the midpoint of the water type between the near surface and near bottom water layers. Mobilization criteria for sampling events will be consistent with what is outlined in Section 10.2.1.2 for point sources Category 2A and Category 2B CSO sampling. Sampling events must be preceded by at least a 48-hour dry period (defined as less than 0.1 inch of rainfall). Rainfall data collected at the field facility and National Grid weather stations will be monitored prior to and during sampling events. Additional details regarding weather monitoring procedures and criteria for mobilization are provided in Standard Operating Procedure (SOP) NC-29– Point Sources Weather Tracking (see Attachment 1).

In addition to the collection of water samples for the Phase 2 surface water chemistry list, a depth profile of various water quality parameters (temperature, pH, salinity, dissolved oxygen [DO], conductivity, and turbidity) will be obtained at each location during each event using a water quality sonde.

8.1.1.2 Surface Water Sampling in East River

Samples will be collected from the following locations: one in the East River in the vicinity of the mouth of Newtown Creek and from three locations across Newtown Creek at its mouth, as presented on Figure B8-1b. Samples will be collected from three depths at each location: one near the surface (approximately 3 feet from the water surface), one at mid-depth, and one near the bottom (approximately 2 to 3 feet above the mudline). Sampling will occur once per month for 10 months to evaluate possible seasonal changes in East River water quality.

For the three locations at the mouth of Newtown Creek, seven events will be conducted during flood tide conditions only, and three events will be conducted during both flood tide conditions and ebb tide conditions. Sampling will occur as close to the peak of the flood and ebb tides as practicable. During four of the seven flood tide only sampling events and during the three flood tide and ebb tide sampling events, the Newtown Creek sample will be a three-point composite (i.e., water will be composited from two nearshore samples and one center-channel sample). During the other three flood tide only sampling events, discrete (i.e., non-composite) samples will be collected at each of the three Newtown Creek locations (i.e., two nearshore samples and one center-channel sample). The tentative schedule for this sampling is presented in the following table. For the East River location, all ten sampling events will occur at flood tide only.

Tentative Schedule for Surface Water Sampling in East River (Newtown Creek Locations)

Monthly East River Sampling Round Number	Sampling at Three Locations at the Mouth of Newtown Creek		Tide Condition	
	Composite	Discrete	Flood Tide Only	Flood Tide and Ebb Tide
1		✓	✓	
2	✓			✓
3	✓		✓	
4		✓	✓	
5	✓			✓
6	✓		✓	
7		✓	✓	
8	✓			✓
9	✓		✓	
10	✓		✓	

All water column samples collected will be submitted for the Phase 2 surface water chemical list as presented in Table B8-1. In addition to water sample collection, a depth profile of various water quality parameters (temperature, pH, salinity, DO, conductivity, and turbidity) will be obtained during each event using a water quality sonde.

8.1.1.3 TSS Concentration Sampling

Phase 2 dry-weather surface water sampling for TSS concentrations will be conducted at 13 locations in Newtown Creek as presented on Figure B8-2. The 13 locations correspond to many of the locations where sondes will be deployed (see Section 8.2). Samples will be collected during two dry-weather events concurrent with the risk surface water sampling program (see Section 4.1 of the *Phase 2 Field Sampling and Analysis Plan – Volume 1* [Phase 2 FSAP Volume 1]). Dry-weather events must be preceded by at least a 72-hour dry period (defined as less than 0.1 inch of rainfall). Rainfall data collected at the National Grid and the field facility weather stations will be monitored to ensure the dry period requirement has been met prior to sampling. At each location, samples will be collected from two depths—one near the surface and one near the bottom.

In addition to the collection of water samples for TSS concentration, a depth profile of various water quality parameters (temperature, pH, salinity, DO, conductivity, and turbidity) will be obtained at each location during each event using a water quality sonde.

8.1.2 Procedures

Surface water sampling procedures are described in the following sections. All of the tasks described in this section will be documented, and this documentation will be stored in the project files as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

Water column profiling will be conducted as necessary at each of the surface water stations prior to sample collection. Once on station, a multi-parameter sonde will be deployed to measure water quality parameters vertically throughout the water column in accordance with SOP NC-09 – Water Quality Monitoring and Profiling (see Attachment 1 of Phase 2 FSAP Volume 1). Water quality parameters including DO, temperature, salinity, conductivity, pH, and turbidity will be measured at 1-foot increments during water column profiling. In order not to disturb sediments, the initial water depth will be measured using the vessel's echo-sounder, and water column profiling will end approximately 2 feet above the mudline.

Stratification information from water column profiling (e.g., observable changes in salinity, temperature, DO, and turbidity that indicate stratification) will be used to confirm the collection depths for analytical water samples. Sample collection for chemistry (analytical program) or for nutrients and TSS (ecological program) will be performed using peristaltic or submersible pumps (i.e., Whale or Mini-Typhoon pumps) and laboratory-supplied sample tubing in accordance with SOP NC-10 – Surface Water Sample Collection. A submersible pump will only be used if a large volume of water needs to be collected in a relatively short timeframe (such as during surface water sampling during point source discharge events). Water samples will be transferred directly from the sample tubing into pre-cleaned, laboratory-supplied containers. Samples collected for dissolved nutrients and dissolved metals will be filtered using 0.45-micrometer (μm) filters. Samples collected for trace metal analyses will be collected using USEPA's "clean hands" procedures (USEPA 1996) to minimize contamination.

Field notes and water quality parameters measured during profiling and sample collection will be recorded either on field forms or electronically using the Anchor QEA, LLC (Anchor QEA) Field Scribe program. Field notes will be maintained on the Daily Log (see SOP NC-01 – Field Records for sample form), and on data collection forms (see SOPs NC-09 – Water Quality Monitoring and Profiling and NC-10 – Surface Water Sample Collection for sample forms) during the monitoring period. Photographs will be taken of the surface water monitoring stations and any significant observations made during sampling will be logged.

During surface water sampling, water column profiling, and other on-water activities, a visual survey will be performed of the shoreline for intertidal shoreline seeps (fluid emerging from the shoreline), overland flow locations, flow from outfalls and other pipes discharging to the reference areas (including estimated rates of discharge), visual signs of impacts (sheens, color, and solids), and the presence of floatables. The objective of this survey is to identify significant contributors of water discharges to the sampling location that may affect water quality or chemistry. These visual observations will be recorded on the Visual Observations Log (see SOP NC-01 – Field Records for example form).

If observed, opportunistic sampling of seeps may be conducted during the Phase 2 RI field program. Locations for the collection of these samples will be identified based on observations and will be focused on seeps with significant discharge volumes and showing visual signs of contamination (e.g., discoloration or sheens). When first observed, a photograph of the potential seep will be taken and submitted to USEPA for discussion on the sampling procedures, access issues, and analyte list. Based on the outcome of these discussions, an opportunistic sample may be collected from the observed seep following the analytical procedures outlined in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volume 2).

Also during surface water sampling and/or water column profiling and other Phase 2 sampling activities, human recreational use of the Study Area will be documented. The types of potential recreational activities that the field team staff will record include kayaking or other noncommercial water craft on the water, self-contained underwater breathing apparatus (SCUBA) diving, swimming or wading activities, fishing from on the water or from the shore, and crabbing along the shore. These visual observations will be recorded on the Visual Observation Log (see SOP NC-01 – Field Records for example form).

8.1.2.1 Pre-Sampling Activities

Pre-sampling activities will include the following:

- Ensuring that required notifications for the type of sampling and stations within the Study Area and reference areas have been submitted and approved for each day's activities (see Table B3-1 of the Phase 2 FSAP Volume 1; Anchor QEA 2014b)
- Reviewing the *Phase 2 Health and Safety Plan* (Phase 2 HASP; see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate personal protective equipment (PPE), and safety meetings to be conducted prior to and during sample collection activities

- Identifying the type of boat for sampling based on logistical constraints due to bridges and tides: The Field Manager will provide pertinent information, including contact telephone numbers for each of the moveable bridges.
- Checking tide charts for water-level conditions throughout the sampling period
- Checking weather conditions for the day prior to leaving the dock, and throughout the day for changing conditions
- Checking rainfall data to determine if an event has met a given program criteria for rainfall: Weather monitoring procedures and criteria for mobilization are provided in SOP NC-29 – Point Sources Weather Tracking (see Attachment 1).
- Obtaining a final sample table from the Project Chemist/Field Manager: A sample table, organized by station, will be compiled for each sampling mobilization. This table will include station number, analyses to be conducted, quality assurance (QA)/quality control (QC) samples required, holding times, preservation, and laboratory addresses. USEPA will be notified 2 weeks (minimum) in advance of sampling, and provided a copy of the final sample table. If USEPA has requested split sampling, this notification will be made 3 weeks (minimum) prior to sampling, except for surface water sampling during point source discharge events (see Section 8.1.1.1). For sampling during point source discharges, Anchor QEA will notify the Newtown Creek Group (NCG) and USEPA at least 48 hours in advance of a potential sampling event and as soon as possible before potential mobilization in order to plan accordingly for field oversight, if desired. Anchor QEA will notify the NCG and USEPA 24 hours prior to mobilization and again 4 to 6 hours prior to mobilization. Additional notifications will be made as necessary if the forecasted storm event timing shifts. In addition to these notifications, each sampling location may have specific access and notification requirements, which will be detailed in the location-specific sampling packages.
- Calibrating the multi-parameter sonde for DO, temperature, salinity, conductivity, pH, turbidity, and depth (see SOP NC-09 – Water Quality Monitoring and Profiling)
- Preparing a daily float plan for communication between the land-side and boat-based field team staff, including stations to be sampled, target coordinates, Study Area and reference area access points, and sample transfer locations (target coordinates will be pre-loaded into a differential global positioning system [DGPS] unit)

8.1.2.2 Sampling Activities

It is anticipated that the boat crew for surface water sampling and water column profiling will consist of four or five field team staff, including a boat captain. The sampling vessel will also accommodate USEPA personnel, USEPA contractor personnel for oversight, New York State Department of Environmental Conservation (NYSDEC) personnel, and personnel for representatives of the NCG for observation. Anchor QEA will be notified at least 1 week prior to any vessel oversight in order to make the appropriate accommodations for all surface water programs except during point source discharges. The boat crew will maintain frequent communication with the Field Team Leader during sampling activities.

On each day of sampling, the designated field team staff will confirm the schedule, and stations to be sampled, with the Field Team Leader, and also collect the appropriate communications equipment. Prior to boarding the boat, a daily safety meeting will be conducted by the Project On-site Safety Officer (POSO), and additionally a health and safety meeting will be performed by the boat captain. Prior to leaving the dock, the POSO (or a designee) will confirm that the captain has completed an inspection of the boat (including an inventory of required safety gear [i.e., personal floatation devices and radios]), conducted a communications check, and filed a daily float plan.

The following surface water sampling activities and procedures will be implemented:

- Pre-cleaned sampling and profiling equipment will be loaded on the boat, including decontamination fluids/equipment and investigation-derived waste (IDW) containers, and place fresh ice in the sample holding containers. It will be determined whether the sampling boat is sufficient to accommodate the equipment and containers; if not, a support boat will be used to transport containers and collected samples (under chain-of-custody [COC]) as necessary.
- The boat will be navigated to the target station. The boat will be positioned at the target station using procedures described in SOP NC-03 – Navigation and Boat Positioning.
- Sample station survey coordinates (horizontal datum in North American Datum of 1983 [NAD83], New York Long Island [NYLI], State Plane feet) will be recorded on the surface water sample record and/or Anchor QEA Field Scribe program on a field

laptop (see SOP NC-09 – Water Quality Monitoring and Profiling in Attachment 1 of Phase 2 FSAP Volume 1). The Anchor QEA Field Scribe program will be used to determine proximity to the target station. Once within limits listed in SOP NC-03 – Navigation and Boat Positioning, the vessel engine will be turned off. Coordinate data will be obtained with an external Trimble GeoXH global positioning system (GPS) receiver capable of sub-meter accuracy.

- Care will be taken not to disturb/contact sediments during collection of water samples because any entrainment of sediment into a water sample will result in non-representative results.
- Once on station, the depth to mudline will be measured using the on-board fathometer so as not to disturb the sediment. A more accurate measurement with a weighted water-level meter, tape, or other depth measurement device will be made once all samples are collected. Throughout each event, in an area where sampling will not occur during that day, periodic depth measurements using both the fathometer and a weighted line will be taken simultaneously to calibrate the fathometer's accuracy.
- Water clarity will be measured with a Secchi disk. The Secchi disk reading will be taken from the shady side of the boat by lowering the disk beyond the point of disappearance, then raising it up until it reappears. The depth of disappearance, reappearance, and the Secchi depth (the average of the two observations) will be recorded using the Anchor QEA Field Scribe program. When possible, Secchi depth will be taken by the same observer.
- Water quality parameters will be measured with a calibrated multi-parameter sonde capable of logging DO temperature, salinity, conductivity, pH, turbidity, and depth throughout the entire water column. Procedures for water column profiling including instrument calibration, operation, and parameter measurement are provided in SOP NC-09 – Water Quality Monitoring and Profiling.
- Water quality measurements will be collected with a multi-parameter sonde at the water surface (approximately 6 inches in depth) and at 1-foot intervals until approximately 2 feet above the mudline. Data from each interval will be recorded electronically using the Anchor QEA Field Scribe program on a field laptop (see SOP NC-09 – Water Quality Monitoring and Profiling in Attachment 1 of Phase 2 FSAP Volume 1). Once complete, the data will be exported to a comma-separated

values (.csv) file and imported into Excel where all parameters will be plotted per depth. Plots of temperature and salinity will be the primary parameters used to determine stratification and the existence of individual water layers.

- The multi-parameter sonde will also be operated in logging mode for a continuous record of the water quality measurements. Files will be downloaded as soon as possible to ensure adequate backup exists. The following will be performed:
  - Following collection, the water column profile data will be reviewed for stratification, as follows:
    - If no stratification is observed (i.e., based on obvious transitions in temperature, salinity, DO, and turbidity observed in collected profiles) or if two water types are observed and when water depth is sufficient (i.e., 8 feet or deeper), surface water samples will be collected from two depths at each surface water sampling station. One surface water sample will be collected just below the water surface (approximately 3 feet below the water surface). One deeper sample will be collected at approximately 2 to 3 feet above the mudline except in areas where significant slopes or contact with the sediments is a significant concern, in which case the sample will be collected at 3 feet above the mudline.
    - If stratification with more than two distinct water types is observed, one additional sample may be collected from the midpoint of the additional water type.
    - When water depth is less than 8 feet, and no stratification is observed, one surface water sample will be collected. This sample will be collected from the midpoint in the water column. However, if stratification is observed, a sample will be collected of each layer as practical.
- Surface water samples for all analyses will be collected using a peristaltic pump (or submersible pump, if appropriate) with the sample tubing (or submersible pump) attached to a weighted line.
- Water samples will be collected from the surface to the bottom at each discrete sample depth. Water samples will be transferred directly from the sample tubing through the peristaltic pump (or submersible pump through the tubing, if appropriate) into laboratory-supplied containers (may be filtered and preserved as

applicable; see Table B8-2) using USEPA's "clean hands" procedures (USEPA 1996; for trace metals analysis) to minimize contamination.

- Following collection into the laboratory-supplied container, the surface water samples will be placed in a cooler at 4 degrees Celsius (°C) for transport to the field facility where they will be packaged for shipment.
- All field activities will be documented, including sampling and profiling activities using the Anchor QEA Field Scribe program or field forms as appropriate (see SOP NC-09 – Water Quality Monitoring and Profiling and SOP NC-10 – Surface Water Sample Collection). Field forms (paper and/or electronic) will be filled out in their entirety. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Survey data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files. At the end of the day and between sample intervals, the multi-parameter sonde will be decontaminated per SOP NC-02 – Equipment Decontamination prior to the next use.

8.1.2.3 Sample Processing

Surface water samples will be filtered and preserved as needed on the boat at the time of sampling and then transported to the field facility for packaging and shipping. Samples will be transferred from the sample custodian on the boat to a sample custodian on the shore from the field facility per SOP NC-06 – Sample Custody. Once samples are received at the field facility, the samples will be checked and the information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody. Sample containers will be stored at 4 °C pending shipment to the laboratory per SOP NC-07 – Sample Packaging and Shipping. Sample handling and shipping procedures are discussed in Phase 2 FSAP Volume 1 Section 13.2.3.

8.1.2.4 Station Location and Frequency

Surface water sampling will be conducted for each program during 2014 as described in the Phase 2 RI Work Plan Volume 2 and summarized in the following sections. Surface water sample stations within the Study Area and East River are presented on Figures B8-1a and B8-1b.

Surface water sampling during point source discharge events will be conducted at 18 locations in the Study Area during the Phase 2 RI Volume 2 field program. Samples will be collected at each of the locations described previously during five point source discharge events where total rainfall of 0.40 inch is predicted to occur during the event. Each location will be sampled up to two times during a single event, roughly corresponding to the peak and falling limb of the hydrograph; however, the actual number of samples collected at each location during a single event will depend on the duration of that event (i.e., it may not be possible to obtain two samples at all locations during a relatively short, high-intensity event).

Surface water sampling in the East River and mouth of Newtown Creek will be conducted at four locations during flood tide conditions: one in the East River in the vicinity of the mouth of Newtown Creek and one three-point composite from a transect across Newtown Creek at its mouth (see Section 8.1.1.2), once per month for 10 months.

8.1.2.5 Sample Designation

Samples will be uniquely identified at the time of collection as described in Section 13.2.1 of the Phase 2 FSAP Volume 1. Nomenclature is {station identification}{matrix code}-{depth}-{date} where:

- Station identification = a five-character identifier for the station identified on Figures B8-1a and B8-1b. The identifier will begin with a two-character identifier to indicate the sample collection area and will be followed by a three-digit number that indicates the position. Composite samples will include the composited station ID three-digit numbers within the station ID to denote where the samples were collected. Field duplicates will be identified by adding 1000 to the three-digit position number. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek

  - EB = East Branch
  - EK = English Kills
  - ER = East River

- Rinsate and trip blanks will not require a station identifier.
- Matrix code = a two-character code to indicate the sample matrix. Matrix codes are as follows:
  - SW = surface water
  - RB = rinsate blank
  - TB = trip blank
- Depth = water depth. Surface waters will be designated by three depth indicators, as follows:
  - A = near surface (or only sample depth if collected in less than 8 feet of water with no observable stratification)
  - B = middle sample depth, which may be collected if a third water type is observed
  - C = near bottom

  The actual depth of collection will be recorded on water sample collection forms and loaded into the project database. For the surface water sampling in East River (see Section 8.1.1.2), an "F" or "E" will precede this depth designator for samples collected from the three locations at the mouth of Newtown Creek to indicate flood tide conditions or ebb tide conditions, respectively.
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD (i.e., four digits for year, two digits for month, and two digits for day).

The following are examples:

- A surface water sample collected in the upper water column of Dutch Kills at the first station on May 16, 2014, would have the following ID: DK001SW-A-20140516.
- A rinsate blank collected in association with surface water sampling collected on June 1, 2014, would have the following ID: SW-RB-20140601.

- A composite surface water sample collected near the bottom of the water column in Newtown Creek at Stations NC243SW, NC244SW, and NC245SW on May 16, 2014, would have the following ID: NC243244245SW-C-20140516.

8.1.2.6 Sample Handling and Analysis

Surface water samples will be analyzed for the constituents identified in the Phase 2 RI Work Plan Volume 2 Table 7-2 and summarized by analysis in Table B8-1 as well as in the Phase 2 QAPP (see Worksheet No. 20 – Field Quality Control Sample Summary Table in Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). Samples will be packaged and shipped to the laboratory in accordance with SOP NC-07 – Sample Packaging and Shipping (see Section 13.2.3 in Phase 2 FSAP Volume 1). Further information on the analytical program and specific analytes are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

8.1.2.7 Equipment Decontamination

Surface water sampling equipment will be in contact with site media and, therefore, will require decontamination. Equipment will be decontaminated between sample stations and at the end of each day. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

8.1.2.8 Investigation-Derived Waste

IDW will be generated during the performance of the surface water sampling equipment decontamination. Used PPE will also be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

8.1.2.9 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning

- NC-06 – Sample Custody
- NC-07 – Sample Packaging and Shipping
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-09 – Water Quality Monitoring and Profiling
- NC-10 – Surface Water Sample Collection
- NC-29 – Point Sources Weather Tracking

8.1.3 Data Processing, Analysis, and Management

Electronic data collection records, including water column profiles, will be downloaded as soon as possible and saved to the project files. Paper records will be scanned and sent to the Data Management Task Manager. Survey data will be loaded into a geographic information system (GIS)-based spatial database and added to the reference area basemaps.

The data collected from the surface water sampling activities will be stored in the project files. Analytical data will be validated in accordance with USEPA Region 2 data validation protocols as described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2) Worksheet No. 35 (Data Verification Procedures), Worksheet No. 36 (Data Validation Procedures), and Worksheet No. 37 (Data Usability Assessment). Analytical data will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2). The data will be evaluated to describe chemical and physical conditions for surface water in the Study Area.

8.1.4 Reporting

Information obtained during surface water sampling will be included in the RI report and other deliverables, as appropriate.

8.1.5 Schedule

Surface water sampling will occur over a 10-month period, with sampling programs conducted with the Phase 2 Volume 1 field program, or on a wet-weather monthly schedule based on the objective of the field program.

8.2 Continuous Surface Water Monitoring

This section describes how the continuous surface water monitoring program will be conducted. The scope development is described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

8.2.1 Overview

The following sections present a summary of the continuous surface water monitoring program including the purpose and a summary of the work to be completed during Phase 2.

Purpose. Continuous surface water monitoring will be conducted within the Study Area to meet the following objectives:

1. Collect current velocity, temperature, and salinity data to calibrate the hydrodynamic model.
2. Collect turbidity and TSS concentration data to develop a relationship between measured TSS concentrations and turbidity, with the goal of using the continuous turbidity and TSS concentration data collected over five wet-weather and two dry-weather events to calibrate the sediment transport model.
3. Deploy telemetry equipment to help inform water column sampling surveying that will occur during point source discharge events.
4. Measure near-bed current velocities and turbidity to assess propeller wash (propwash) resuspension, mixing, and redistribution of bed sediments within Newtown Creek and support the development and calibration of a propwash resuspension model.

Summary of Work to be Performed during Phase 2. A total of 21 near-surface and near-bed samplers (sondes) will be installed for continuous water column monitoring at 15 locations in Newtown Creek (see Figure B8-2). Six of the locations include near-surface and near-bed sondes that will be attached to shoreline structures (e.g., bulkhead or pier), as follows:

- Four of the sondes will be located at shoreline property that will not have access limitations (e.g., property is owned by NCG member).
- The sondes proposed to be located in English Kills and East Branch are on property where shoreline access will need to be granted by the respective property owners.

The remaining nine locations will be near-bed sondes that will be located in the channel of the creek and tributaries. Near-surface samplers cannot be deployed in the creek channel because of potential interference with ship traffic and high probability of vandalism or theft.

Continuous water column monitoring will be conducted using a data sonde containing probes that will measure the following parameters: 1) conductivity; 2) temperature; 3) turbidity; 4) pH; 5) DO concentration; and 6) oxidation-reduction potential (ORP). Sonde data will be collected at a frequency of one reading every 15 minutes. Conductivity data will be converted to salinity (practical salinity units) using a standard correlation relationship.

8.2.2 Procedures

Two sondes will be deployed at six shoreline monitoring locations, with one sonde placed near bottom (i.e., about 2 feet above the sediment bed) and the other sonde placed near surface (i.e., about 1 foot below mean lower low water). At each shoreline location, the two sondes will be attached to the bulkhead or placed on a fabricated piece of equipment along the shoreline.

Near-bed sondes will be deployed at nine in-channel locations, of which six are located adjacent to the shoreline sampling locations. Near-surface sondes cannot be deployed in the creek channel because of potential damage by ship traffic, vandalism, or theft.

Telemetry equipment will be linked to the near-surface sondes located at the English Kills and East Branch locations (EK087SO and EB043SO; see Figure B8-2). Salinity data from these near-surface sondes will be transmitted via cellular modem to a secure project website. The transmitted data will provide real-time assessment of salinity in the English Kills and East Branch portions of Newtown Creek that can be used to help inform the water column sampling surveys described in Section 8.1.

8.2.2.1 Pre-Monitoring Activities

A reconnaissance survey will be conducted prior to deployment in order to assess the adequacy of the proposed locations, by considering the following questions:

- Does the property provide sufficient access from waterborne craft?
- Do any obstructions exist that would limit deployment, operation, and/or maintenance of sampling equipment?
- Does the property provide sufficient security for unattended sampling equipment (e.g., fencing, limited accessibility from land)?
- Is there frequent boat traffic in the vicinity that could impact the results of water quality monitoring data (i.e., sonde data)?

If location adjustments are deemed warranted based on this assessment, 200 feet will be considered the maximum distance that sondes can be moved without impacting the objectives. If adjustments beyond 200 feet are deemed necessary, USEPA will be notified to approve the modification prior to instrument deployment.

Following the reconnaissance survey, the following additional activities will be conducted prior to placement of the sondes:

- Ensuring that required permits and notifications for the type of sampling and locations within the Study Area have been submitted and approved for the days' activities
- Review of the Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate PPE, and safety meetings to be conducted prior to field work
- Verification of instrument functionality prior to shipment to the site
- Calibration of meters in accordance with procedures and schedules outlined in the probe operations maintenance manual
- Installation of meters in a suitable and secure location for the entire deployment period

8.2.2.2 Monitoring Activities

The following monitoring activities will be conducted during the deployment period:

- Maintenance to minimize external interferences will occur weekly for the shoreline sondes and monthly for the in-channel sondes: If this servicing schedule is found to be unnecessarily frequent, it may be decided to decrease the frequency.

- Monthly downloading of data, and quality checks on data for meters without telemetry
- Periodic checks of telemetry water quality data for quality
- Calibration of meters in accordance with procedures and schedules outlined in the probe operations maintenance manual

8.2.2.3 Station Location and Frequency

Continuous surface water monitoring locations are presented on Figure B8-2, and station IDs, target coordinates, and monitoring details are located in Table B8-3.

8.2.2.4 Station Designation

Monitoring stations will be uniquely identified at the time of measurement as described in Section 13.2.1 of the Phase 2 FSAP Volume 1. Nomenclature is {station identification}{matrix code}-{depth}-{date} where:

- Station identification = a five-character identifier for the station identified on Figure B8-2. The identifier will begin with a two-character identifier to indicate the sample collection area and will be followed by a three-digit number that indicates the position. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- Matrix code = a two-character code to indicate the sample matrix. The matrix code is as follows:
  - SO = sondes
- Depth = water depth; surface waters will be designated by two depth indicators, as follows:

- A = near surface (or only sample depth if collected in less than 5 feet of water)
- C = near bottom

- The actual depth of measurement will be recorded on water sample monitoring forms and loaded into the project database.
- Date = an eight-character code to indicate the date the measurement was taken in the format YYYYMMDD (i.e., four digits for year, two digits for month, and two digits for day).

The following is an example:

- Sonde monitoring results collected in the upper water column of English Kills at the first station on May 16, 2014, would have the following ID: EK087SO-A-20140516.

8.2.2.5 Equipment Decontamination

Surface water monitoring equipment will be in contact with site media and, therefore, will require decontamination. Equipment will be decontaminated between stations and at the end of each day. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

8.2.2.6 Investigation-Derived Waste

IDW will be generated during the performance of the continuous surface water monitoring equipment decontamination. Used PPE will be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

8.2.2.7 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning

- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-11 – Surface Water Sonde Deployment and Maintenance

8.2.3 Data Processing, Analysis, and Management

Sondes with telemetry located at the near surface of the English Kills and East Branch will transmit real-time data to a secure project website. Periodically, these data will be reviewed and assessed for data quality. Likewise, for meters without telemetry, data will be collected periodically and reviewed for QC and QA purposes. Measures will be taken to correct any data deficiencies or potential issues with the functionality of the sondes.

After the proper checks and data validation are complete on the data, it will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

Temperature and salinity data collected over the course of the study will then be processed and used to calibrate both the hydrodynamic and sediment transport model. An additional analysis of the turbidity data will develop a relationship to allow turbidity data to act as a surrogate for TSS concentrations.

8.2.4 Reporting

Information obtained during continuous surface water monitoring will be included in the RI report.

8.2.5 Scheduling

The sondes will be deployed for a minimum of 3 months. The goal is to collect data during at least five point source discharge events when total rainfall of 0.4 inch or more occurred and include the surface water sampling during point source discharge events, as well as during the intervening dry-weather periods that also include the TSS concentration sampling. Based on the New York City Department of Environmental Protection (NYCDEP) point source model results, a relatively large discharge from the English Kills, East Branch, Maspeth Creek, and Dutch Kills CSOs has a high probability of occurring during an event with 0.4 inch or more of precipitation. If five point source discharge events with a minimum of 0.4-inch precipitation occur during the full 3-month deployment including successfully completing the surface water sampling during point source discharge events, this sampling program will be terminated at the end of 3 months; otherwise, the sampling program will be extended to a maximum of 6 months. It may also be necessary to extend this sampling program beyond 3 months if it is not possible to mobilize for the surface water sampling described in Section 8.1.2 during the first five events that occur within this continuous monitoring window (because one of the objectives of the surface water sampling is to develop a relationship between measured TSS concentrations and turbidity measured under this program element).

8.3 Current Meter Deployment Program

This section describes how the current meter deployment program will be conducted. The scope development is described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

8.3.1 Overview

The following sections present a summary of the current meter deployment program including the purpose and a summary of the work to be completed during Phase 2. The current velocity data will be collected using two types of equipment: an acoustic Doppler current profiler (ADCP) and an acoustic Doppler velocimeter (ADV).

Purpose. Current meter deployment will be conducted within the Study Area to meet the following objectives:

1. Collect current velocity data to calibrate the hydrodynamic model.
2. Provide current velocity information to inform the data collected during the continuous surface water monitoring program.
3. Collect near-bed current velocities and turbidity to assess propwash resuspension, mixing, and redistribution of bed sediments within Newtown Creek and support the development and calibration of a propwash resuspension model.

Summary of Work to be Performed during Phase 2. Current meter deployment will occur at nine near-bed, center-channel locations in Newtown Creek and its tributaries (see

Figure B8-2). Near-surface samplers cannot be deployed in the creek channel because of potential interference with ship traffic and the potential for vandalism and theft. The deployments will be as follows:

- At six of the nine locations, ADCPs will be co-located with sondes that will be installed as part of the continuous surface water monitoring program described in Section 8.2.
- At six of the nine locations, ADVs will be co-located with sondes that will be installed as part of the continuous surface water monitoring program described in Section 8.2. ADV deployments will be co-located with the ADCPs, with the exception of three locations.

The ADCP will collect multiple binned measurements of current velocity data (i.e., magnitude and direction) and acoustic backscatter over the water column. The ADV will collect velocity measurements and acoustic backscatter at a single point in the water column using a converging beam pattern.

8.3.2 Procedures

The ADCPs will be deployed at six center channel locations and will be mounted approximately 3.5 feet above the sediment bed. The ADCP current velocity data will be collected as a 10-minute average recorded every 10 minutes (sampling over the averaging interval will be one measurement every 2 seconds). The ADVs will be deployed at six center channel locations and will be mounted to collect data at a point in the water column that is approximately 4 inches above the sediment bed. The ADVs will collect near-bed current velocity data at a continuous one sample per second (i.e., 1-hertz sampling frequency) and acoustic backscatter also at a frequency of 1 hertz.

8.3.2.1 Pre-Placement Activities

A reconnaissance survey will be conducted prior to deployment in order to assess the adequacy of the proposed locations in conjunction with the water quality sonde reconnaissance survey detailed in Section 8.2.2. Similarly for current meters, if location adjustments are deemed warranted based on this assessment, 200 feet will be considered the maximum distance that stations can be moved without impacting the objectives. If adjustments beyond 200 feet are deemed necessary, USEPA will be notified to approve the modification prior to instrument deployment.

Following the reconnaissance, the following activities will be conducted prior to placement of the current velocity meters:

- Ensuring that required permits and notifications for the type of sampling and locations within the Study Area have been submitted and approved for the days' activities
- Review of the Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate PPE, and safety meetings to be conducted prior to and during the current meter-related activities
- Verification of instrument functionality prior to shipment to the site
- Calibration of meters in accordance with procedures and schedules outlined in the probe operations maintenance manual

8.3.2.2 Deployment of Instrument Moorings

The current meters will be deployed following the completion of reconnaissance survey and agreement on any required location changes. Current meters will be provided and deployed by a subcontractor. Current meters will be set up and tested prior to deployment in accordance with SOP NC-18 – Current Meter Deployment and Data Collection and the manufacturer's recommendations.

It is anticipated that the boat crew for measurement activities will consist of four field team staff, including a boat captain, two subconsultants, and one field staff. The boat crew will be in constant communication with the Field Team Leader during sampling activities.

On each day of the measurement activities, the designated field team staff will check with the Field Team Leader to confirm the schedule and the designated current meter stations and collect the appropriate communications equipment. In addition to the daily safety meeting conducted by the POSO, a health and safety meeting will be performed by the boat captain prior to boarding the boat. Prior to leaving the dock, the POSO or a designee will confirm that the captain has completed an inspection of the boat, including an inventory of required safety gear (i.e., personal floatation devices and radios), has conducted a communications check, and has filed a float plan.

The following activities will be implemented for the deployment of instrument moorings:

- Water level pressure transducers will be checked for proper operation and download previous month's data in accordance with manufacturer's recommendations.
- All pre-cleaned current meter equipment will be loaded on the boat.
- The boat will be navigated to the target station. The boat will be positioned at the target station using procedures described in SOP NC-03 – Navigation and Boat Positioning. Record survey coordinates (horizontal datum in NAD83 using NYLI) for each current meter station. Data will be collected on a Panasonic Toughbook® handheld tablet computer, or similar, with an external Trimble® GeoXH GPS receiver capable of sub-meter accuracy. A custom GPS program will be used to allow for real-time data collection.
- Data recording will be initiated and current meters will be deployed in accordance with manufacturer's recommendations.
- Calibration checks of field instruments will be conducted as needed where readings are suspect to produce accurate and reproducible data.
- Field instruments will be recalibrated, when necessary, during periodic maintenance to confirm that the instrument functioned properly and to provide information to assess drift, if any, occurring during the period of operation.
- All field activities will be documented. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Survey data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager at the end of each day's sampling activities.
- All field activities will be documented, including sampling and profiling procedures, and the Water Quality Data Log will be filled out in its entirety. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.

8.3.2.3 Periodic Boat-Based Surveys to Allow Moored Instrument Servicing/Data Downloading

Deployed ADCPs and ADVs will be serviced approximately monthly, with the timing dependent on field conditions (weather) and the history of sensor fouling/debris interference at a given station. The deployed meter(s) will be retrieved, data will be downloaded, and an initial inspection of the data will be performed. If there are no obvious data quality issues, the instrument will be cleaned, batteries checked, and redeployed. If there are issues with the mooring setup, the meters, or downloaded data, the meter may either be replaced at that time (if a replacement is available), pulled for repair, or a replacement survey scheduled. Procedures described in Section 8.3.2.2 will be followed during this monthly servicing.

8.3.2.4 Station Location and Frequency

Current meter locations are presented on Figure B8-2, and station IDs, target coordinates, and details are located in Table B8-3.

8.3.2.5 Station Designation

Current meter stations will be uniquely identified at the time of collection as described in Section 13.2.1 of the Phase 2 FSAP Volume 1. Nomenclature is {station identification}{matrix code}-{date} where:

- Station identification = a five-character identifier for the station identified on Figure B8-2. The identifier will begin with a two-character identifier to indicate the sample collection area and will be followed by a three-digit number that indicates the position. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- Matrix code = a two-character code to indicate the sample matrix. The matrix code is as follows:

  - AP = ADCP
  - AV = ADV
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD (i.e., four digits for year, two digits for month, and two digits for day).

8.3.2.6 Equipment Decontamination

Current meters will be in contact with site media and, therefore, will require decontamination. Equipment used during manual inspections of the moorings will be decontaminated between sample stations and at the end of each day and deployed meters will be cleaned during routine inspection. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

8.3.2.7 Investigation-Derived Waste

IDW will be generated during the performance of the current meter deployment equipment decontamination. Used PPE will be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

8.3.2.8 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-18 – Current Meter Deployment and Data Collection

8.3.3 Data Processing, Analysis, and Management

Current velocity meter data will be collected periodically and reviewed for QC and QA purposes. Measures will be taken to correct any data deficiencies or potential issues with the functionality of the meters.

After the proper checks and data validation are complete on the data, it will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

Current meter velocity data collected over the course of the study will then be processed for instrument errors or other flaws in the data and will be used to calibrate both the hydrodynamic and sediment transport model.

8.3.4 Reporting

Information obtained during current velocity data collection will be included in the RI report.

8.3.5 Scheduling

The ADCPs will be deployed for a minimum of 3 months. The goal is to collect data in conjunction with sonde deployment (see Section 8.2) during at least five point source discharge events when total rainfall of 0.4 inch or more occurred and include the surface water sampling during point source discharge events, as well as during the intervening dry-weather periods that also include the TSS concentration sampling. Based on NYCDEP point source model results, a relatively large discharge from the English Kills, East Branch, Maspeth Creek, and Dutch Kills CSOs has a high probability of occurring during an event with 0.4 inch or more of precipitation. If five point source discharge events with a minimum of 0.4-inch precipitation occur during the full 3-month deployment, the ADCP deployment will be terminated at the end of 3 months; otherwise, it will be extended to a maximum of 6 months. It may also be necessary to extend the ADCP deployment beyond 3 months if it is not possible to mobilize for the surface water sampling described in Section 8.1.2 during the first five events that occur within this deployment window. The ADVs will be deployed for 3 months because they are not dependent on surface water sampling.

8.4 Groundwater

The groundwater portion of the Phase 2 RI Work Plan Volume 2 has been developed by USEPA. The Phase 2 FSAP Volume 2 associated with the groundwater program will be submitted as a separate document.

9 SEDIMENT (VOLUME 2)

Phase 2 RI Volume 2 field program sampling will include surface sediment sampling (as presented in Section 9.1), core sampling of surface and subsurface sediment and native material (as presented in Section 9.2), and in-creek sediment traps (as presented in Section 9.3). Surface sediment is defined as the top 0 to 15 centimeters (cm) below the sediment surface or mudline (unless otherwise noted), and subsurface sediment is defined as the deposits below 15 cm below mudline and above the native material (unless otherwise noted).

9.1 Surface Sediment Sampling

This section describes the procedures that will be followed to perform the surface sediment sampling. Sediment sampling activities may be conducted using different equipment and/or during separate mobilizations. The scope development activities for this work are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

9.1.1 Overview

The following sections present a summary of the surface sediment sampling program including the purpose and summary of work to be completed during Phase 2.

Purpose. Surface sediment sampling will be conducted along the length of the Study Area and its tributaries to meet the following objective:

- Further evaluations of sediment chemical concentrations in English Kills and the Turning Basin of Newtown Creek to confirm contaminant distributions

Summary of Work to be Performed during Phase 2. The Phase 2 objectives in the Phase 2 RI Work Plan Volume 2 will be addressed by conducting additional surface sediment sampling. The majority of the Phase 2 surface sediment programs are included in the Phase 2 Volume 1 field program presented in the Phase 2 FSAP Volume 1.

The surface sediment sampling program includes the following:

- **Confirmation of Contaminant Distribution in Unique Areas** – Conduct surface sediment chemistry sampling in English Kills and the Turning Basin in Newtown Creek.

Surface sediment stations will be sampled for a designated list of parameters as discussed in Table B9-1, which provides the sampling stations, and analytes/analyte groups for each station. Figure B9-1 shows the surface sediment sampling stations within the Study Area included in this Phase 2 FSAP Volume 2. These stations may be adjusted based on the results of the identification of potential submerged utilities, utility crossings, or other hazards within the Study Area or field conditions. If a station needs to be moved more than 200 feet parallel to the shoreline and/or 50 feet perpendicular to the shoreline, USEPA will be notified prior to sampling. A log of the rationale for significantly moving any station will be maintained and included in the monthly status reports submitted to USEPA.

9.1.2 Procedures

Surface sediment sampling and processing activities for surface samples are described in the following sections. All of the tasks described in this section will be documented, and this documentation will be stored in the project files as described in the *Phase 1 Data Management Plan* (Anchor QEA 2011) and the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2). Field notes will be maintained on the Daily Log (see SOP NC-01 – Field Records for a sample form) and on data collection forms (see SOP NC-12 – Surface Sediment Sample Collection and Processing for sample forms). Photographs will be taken of the surface sediment and any significant observations made during sampling.

Surface sediment sampling will be conducted during the summer. If access to a location or locations is not possible due to anchored vessels or other issues, an attempt will be made to revisit the location, if applicable, or select an alternate location.

Surface sediment samples will be collected using a pneumatic van Veen (power grab) where access allows. Alternately, an Ekman sampler, modified Ekman sampler, modified van Veen sampler, Petit Ponar sampler, or similar sampling device, as appropriate, will be used (refer to

SOP NC-12 – Surface Sediment Sample Collection and Processing). The power grab is the preferred sampler and the other samplers will be used only if the power grab cannot collect a representative surface sediment sample. If a grab sampling technique is unsuccessful at collecting a surface sediment sample, other techniques including collecting the sample by advancing a box corer or sediment core will be considered. The type of grab sampler used will be documented on the field forms. The procedure for collecting a core sample is presented in Section 9.2.

To maintain field efficiency and ensure data collection at difficult stations, samples containing less than 15 cm of sediment will be accepted after three attempts at a station. Specifically, if a depth of 15 cm is not achieved on the first collection attempt, a second attempt will be made. If the second attempt also does not meet the criteria, a third grab will be collected. If all three attempts yield less than 15 cm of depth, the third attempt will be accepted. Subsequent attempts for replicate samples may be accepted if less than 15 cm of depth. The achieved sampling depth of the collected sample will be noted on the field form and reflected in the sample ID.

The surface sediment samples will be collected using the following procedures and in accordance with the referenced SOPs.

Also during surface sediment sampling and other Phase 2 sampling activities, human recreational use of the Study Area will be documented. The types of potential recreational activities that the field team staff will record include kayaking or other noncommercial water craft on the water, SCUBA diving, swimming or wading activities, fishing from on the water or from the shore, and crabbing along the shore. These visual observations will be recorded on the Visual Observation Log (see SOP NC-01 – Field Records for example form).

9.1.2.1 Pre-Sampling Activities

Pre-sampling activities will be completed prior to initiating the surface sediment sampling events. These activities are summarized as follows:

- Ensuring that required notifications for the type of sampling and sampling stations within the Study Area have been submitted and approved for the day's activities (see Table B3-1 of the Phase 2 FSAP Volume 1)
- Reviewing Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate PPE, and safety meetings to be conducted prior to field work
- Identifying the type of boat for sampling based on logistical constraints due to bridges and tides and equipment required for sampling: The Field Manager will provide pertinent information, including contact telephone numbers for each of the moveable bridges. A medium-sized boat is proposed for surface sediment sampling activities, but a small-sized boat may be necessary for some portions of the Study Area. These areas include Dutch Kills where access is limited by fixed bridge clearance, tributary headwaters where floatable containment booms may limit access, and areas where sediment accumulation may limit access.
- Checking tide charts for water-level conditions throughout the sampling period
- Checking weather conditions the day prior to leaving the dock and throughout the day for changing conditions
- Calibrating the photoionization detector (PID) and hydrogen sulfide (H_2S) meter for use on board the boat
- Obtaining final sample table from the Project Chemist/Field Manager that will be compiled for each sampling mobilization and organized by station: This table will include station number, analyses to be conducted, QA/QC samples required, holding times, preservation, and laboratory address. USEPA will be notified 2 weeks (minimum) in advance of sampling and provided a copy of the final sample table. If USEPA has requested split sampling, this notification will be made 3 weeks (minimum) prior to sampling.
- Preparing a daily float plan listing a plan for communication between the land-side and boat-based field team staff, the vessel name and description, names of personnel

on board, the stations to be sampled, access points along the Study Area, sample transfer/transport locations, and the expected time of return

- Pre-loading target coordinates into a DGPS unit
- Checking that water-level pressure transducers are working properly

9.1.2.2 Sampling Activities

It is anticipated that the boat crew for surface sediment grab sampling activities will consist of about four field staff including a boat captain and three crew members. Additionally, a support boat, staffed by a boat captain and a field team staff member and capable of transporting sample containers and collected samples (under COC), will be available in the event the sampling boat cannot accommodate the number of sample containers required for the day. The sampling vessel will also accommodate USEPA personnel, USEPA contractor personnel for oversight, NYSDEC personnel, and representatives of the NCG for observation. Anchor QEA will be notified at least 1 week prior to any vessel oversight in order to make the appropriate accommodations. The boat crew will maintain communication with the Field Team Leader during sampling activities. The boat and crew will meet health and safety requirements as specified in the Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2).

On each day of the sampling, the designated field team staff will check with the Field Team Leader to confirm the schedule and stations to be sampled and collect the appropriate communications equipment. A daily health and safety meeting will be conducted by the POSO or a designee prior to boarding the boat. Prior to leaving the dock, the POSO or a designee will confirm that the captain has completed an inspection of the boat including an inventory of required safety gear (i.e., personal floatation devices and radios), has conducted a communications check, and has filed a daily float plan.

The following activities and sampling procedures will be implemented for surface sediment sample collection:

- Load all pre-cleaned sampling equipment and required sample containers on the boat, include decontamination fluids/equipment and IDW containers, and place fresh ice in sample holding containers. Should the sampling boat be of insufficient size to accommodate the required sample containers, a support boat will be used to transport containers and collected samples (under COC) as necessary.

- Navigate the boat to the target sample station. The boat will be positioned at the target sample station using the procedures described in SOP NC-03 – Navigation and Boat Positioning. For surface sediment sampling, care will be taken to place anchors at a distance where they will not cause disturbance of potentially contaminated sediments in the vicinity of the designated sampling station. An electric motor will be used to stabilize the boat on station as necessary. If additional grab samples are required, the boat will be slightly relocated to obtain the sample using the procedures described in SOP NC-03 – Navigation and Boat Positioning.
- Survey coordinates (horizontal datum in NAD83 using NYLI) for profiling will be recorded for each sample attempt on the sediment grab collection record included in SOP NC-12 – Surface Sediment Sample Collection and Processing. Data will be collected with an external Trimble GeoXH GPS receiver capable of sub-meter accuracy, or equivalent equipment.
- Surface sediment samples will be collected at each station using a power grab, or similar sampling device as appropriate for the type of sediment being sampled. Surface sediment grab sampling procedures are detailed in SOP NC-12 – Surface Sediment Sample Collection and Processing.
- The sediment samples will be taken as follows:
  - The grab sampler will be lowered with a winch to the sediment surface/mudline and allowed to penetrate into the sediment. The jaws will then be pneumatically closed to collect the sample. Prior to retrieval, the boat's position will be recorded.
  - The sampler will then be raised slowly to prevent washing of the sediment from the sampler.
- Once the surface sediment grab sample is retrieved, evaluate whether the sample is acceptable to be retained for processing (i.e., sediment penetration depth is adequate and there are no signs of washout or channeling of the sediment surface) per SOP NC-12 – Surface Sediment Sample Collection and Processing. If acceptable, the surface sediment grab sample will be retained for sample collection.

- At some stations, several attempts may be required to obtain acceptable surface sediment volume. The sampling equipment will not be decontaminated between discrete samples. Sufficient surface sediment will be collected to fill the required analytical bottles for the sample station. In addition, an archive sample will be collected from each station for potential future chemical and supplemental analyses. If multiple attempts are required to attain adequate volume, the grabs will be composited then homogenized prior to filling sample jars. Table B9-2 includes a summary of the sample containers required for each analyte.
- Depending on conditions at the site (e.g., gravel, debris), it may be necessary to adjust sampling locations in order to collect an acceptable sample. For repeated attempts, sampling locations may be adjusted up to 200 feet parallel to the shoreline and/or up to 50 feet perpendicular to the shoreline.
- Material in unacceptable grabs, decontamination fluids, and used PPE will be containerized as IDW. The decontamination fluids will be containerized separately. IDW will be transferred to the field facility, and disposed of according to SOP NC-08 – Investigation-Derived Waste Handling and Disposal.
- Equipment will be cleaned and decontaminated between sampling stations per SOP NC-02 – Equipment Decontamination. However, equipment will not be decontaminated between discrete replicate samples, but the samples will be collected as discrete samples.
- The surface sediment samples will be processed and placed into the appropriate sample containers and packaged for shipping. Sample processing is described in the following.

9.1.2.3 Sample Processing

Surface sediment samples collected for chemical analysis will be processed on the boat or landside at the Anchor QEA field facility. Sampling nomenclature is presented in Section 9.1.2.5 and sample analysis is discussed in Section 9.1.2.6.

Surface grab processing for analytical samples will be as follows:

- Samples will be screened with a PID. Readings will be recorded manually or electronically using the Field Scribe program on the surface grab log (see SOP NC-12 – Surface Sediment Sample Collection and Processing).
- Discrete samples for analyses that cannot be composited (sulfide and methyl mercury) will be collected directly from the center of the sampler without contacting the sides of the sampler as described in SOP NC-12 – Surface Sediment Sample Collection and Processing.
- Following incorporation of all sediment grabs and collection of sub-samples for sensitive parameters, the remainder of the sample will be composited under ambient conditions. A mechanical mixer will be utilized as needed to accommodate large sample volumes. A photographic record and material description will be collected as detailed in SOP NC-12 – Surface Sediment Sample Collection and Processing.
- Sediment in each grab sample will be classified using the Unified Soil Classification System (USCS) and include primary grain size, minor constituents, color, consistency, odors, and visible evidence of impacts (e.g., sheen), debris (e.g., glass or nail), and presence or absence of benthic macroinvertebrates. Note will be taken of the presence of any biota or bacteria on the surface of the grab prior to draining the water from the surface.
- A photographic log will be kept of each grab sample. For each sample, a representative photograph will be taken with a place card of the sampling location, sample interval, and date.
- Sediment will be composited and samples will be placed in the appropriate laboratory-provided sample containers.
- An archive sample for future analysis for chemical and supplemental parameters will be collected from each station.

Samples will be transferred from the sample custodian on the boat to a sample custodian on the shore from the field facility using procedures per SOP NC-06 – Sample Custody. Once samples are received at the field facility, the samples will be checked and information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody.

All field activities will be documented, including sample processing procedures, sample collection and COC, and shipment to the laboratories. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records. Field records/forms will be downloaded to a field facility computer as soon as possible and this information will be forwarded to the Data Management Task Manager.

9.1.2.4 Sample Station and Frequency

Surface sediment sample stations for the Phase 2 RI Volume 2 field program are shown on Figure B9-1 and in Table B9-1. The Phase 2 RI Volume 2 field program includes one round of surface sediment sampling for general chemical analysis.

9.1.2.5 Sample Designation

Samples will be uniquely identified at the time of collection as described in Section 13.2.1 of Phase 2 FSAP Volume 1. The nomenclature that will be used is {station identification}{matrix code}-{depth}-{date} where:

- Station identification = a five-character identifier for the station identified on Figure B9-1. The identifier will begin with a two-character identifier to indicate whether the station is located in Newtown Creek or a tributary and will be followed by a three-digit number that indicates the position. Field duplicates will be identified by adding 1000 to the three-digit position number. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- Rinsate and trip blanks will not require a station identifier.
- Matrix code = a two-character code to indicate the sample matrix. Matrix codes are as follows:
  - SG = surface grab

  - RB = rinsate blank
  - TB = trip blank
- Depth, sediment samples = a six-character identifier indicating the depth in cm from where the samples were collected. The first three characters will indicate the top of the interval and the last three characters will indicate the bottom of the interval.
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD.

The following are examples:

- A surface grab sample collected for chemical analysis at the 26th station of the main Newtown Creek area with a depth of 0 to 15 cm collected on September 8, 2013, would have the following ID: NC026SG-000015-20130908. The duplicate of this surface grab sample would have the following ID: NC1026SG-000015-20130908.
- A rinsate blank collected in association with sediment grab sampling collected on June 1, 2014, would have the following ID: SG-RB-20140601.

9.1.2.6 Sample Handling and Analysis

Surface sediment samples will be analyzed for various analytical programs as detailed in Table B9-1.

Samples will be packaged and shipped to the laboratory in accordance with SOP NC-07 – Sample Packaging and Shipping. Table B9-2 provides the list of analyses, containers, sample size, and laboratory information. Further information on the analytical program and specific analytes are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

9.1.2.7 Equipment Decontamination

Surface sediment sampling equipment will be in contact with site media and, therefore, will require decontamination. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

9.1.2.8 Investigation-Derived Waste

IDW will be generated during the performance of the surface sediment sampling and during equipment decontamination. Cleaning and decontamination of equipment will be conducted between sampling locations. Used PPE will also be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

9.1.2.9 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning
- NC-04 – Photoionization Detector Calibration and Operation
- NC-06 – Sample Custody
- NC-07 – Sample Packaging and Shipping
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-12 – Surface Sediment Sample Collection and Processing

9.1.3 Data Processing, Analysis, and Management

Data collection records from the surface sediment sampling activities, including sample collection, processing, and sample management, will be downloaded as soon as possible and saved to the project files. Paper records will be scanned and sent to the Data Management Task Manager. Survey data will be loaded into a GIS-based spatial database and added to the Study Area basemap.

Analytical data will be validated as described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). Analytical data will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

9.1.4 Reporting

Information obtained during sediment sampling and processing activities for sediment chemistry will be included in the RI report and other deliverables, as appropriate as described in Section 8 of the Phase 2 RI Work Plan Volume 2.

9.1.5 Schedule

Phase 2 RI surface sediment sampling will be conducted in summer of 2014. The schedule will be dependent on weather and field conditions. One round of surface sediment sampling for the programs outlined in this Phase 2 FSAP Volume 2 will be conducted for the Study Area.

9.2 Coring for Surface and Subsurface Sediment and Native Material Sampling

This section describes the procedures that will be followed to perform sediment core collection for surface and subsurface sediment and native material sampling activities. Sediment and native material sampling activities may be conducted using different equipment and/or during separate mobilizations. The scope development activities for this work are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

9.2.1 Overview

The following sections present a summary of the sediment and native material core sampling programs including the purpose and summary of work to be completed during Phase 2.

Purpose. Core sampling will be conducted within the Study Area and its tributaries to meet the following objectives:

1. To support modeling data needs, including the following:
    a. Characterizing the vertical distribution and depositional time history of sediment and constituents within the sediment profile
    b. Providing an assessment of near-surface sediment vertical gradients in contaminant concentrations to allow for estimation of the following:
        i. Contaminant concentrations to which benthic biota may be exposed

ii. Recent sedimentation rates and near-surface mixing rates

iii. Insight into the extent of propwash resuspension causes mixing within the sediment bed at specific locations within the site

c. Evaluating surface and shallow subsurface sediment concentrations in areas to be dredged by New York City (NYC) to provide updated surface concentrations within the dredging areas to support various RI and FS evaluations. These Phase 2 sediment samples (which will include mudline elevation measurements) will only be compared with Phase 1 cores that are within close proximity and specifically at the interval/elevation that corresponds to the elevation at which the Phase 2 post-dredge sample was collected. That is, Phase 2 concentrations beneath the sand cover material will be compared qualitatively with the observed profiles in nearby Phase 1 cores, to help understand the impacts of dredging on vertical profiles. This information will be used for defining subsurface sediment concentrations in the chemical fate and transport model.

d. Assessing the ongoing recontamination potential of point source particulate loads through physical and chemical characterization of sediment mound subsurface sediments

2. To fill nature and extent data gaps from the Phase 1 RI including the following:

   a. **Vertical extent of contamination** – Further evaluations of the depth to native material (which, as discussed in Section 2 of the Phase 2 RI Work Plan Volume 1, generally defines the vertical extent of contamination based on Phase 1 data) and chemical characterization of the native material at a select location

   b. **Refinement of vertical contaminant distribution** – Further refinement of contaminant extent at and below the sediment/native material interface using archived cores at select locations in English Kills where contaminants were observed deeper in the native material

   c. **Confirmation of contaminant distribution in unique areas** – Further evaluations of sediment chemical concentrations at select locations in English Kills and the Turning Basin with unique morphologic and hydrodynamic features

   d. **Confirmation and delineation of nonaqueous phase liquid (NAPL) in the Study Area** – Use of refined sediment core logging procedures during Phase 2 to help confirm the presence of NAPL in sediment and native material and develop and implement a NAPL delineation program based on the results of the confirmation program (if needed)

The Study Area has been dredged along its entire length at some time during its history. In consideration of this history for the purpose of this Remedial Investigation/Feasibility Study (RI/FS), sediments are defined as the deposits that occur above the native materials.

Summary of Work to be Performed during Phase 2. The Phase 2 objectives in the Phase 2 RI Work Plan Volume 2 will be addressed by conducting surface and subsurface sediment and native material core sampling. The sediment coring programs include the following:

- **High-resolution Sample Intervals** – Conduct surface and subsurface sediment sampling in small sample depth increments.
- **Geochronology and Chemistry Sediment Sampling –** Conduct geochronology and chemistry analysis of the subsurface sediment.
- **NYC Post-Dredge Areas Sediment Sampling** – Conduct surface and subsurface sediment sampling following dredging and placement of a 6-inch sand cover in portions of the Study Area to be dredged by NYC (within Whale Creek and adjacent portions of Newtown Creek).
- **Vertical Extent of Contamination** – Conduct subsurface sediment visual observations and native material chemistry analysis at one location near the mouth of Newtown Creek.
- **Refinement of Vertical Contaminant Distribution** – Conduct visual observations at and below the sediment/native material interface of three archived Phase 1 cores in English Kills where contaminants were observed in the native material.
- **Confirmation of Contaminant Distribution in Unique Areas** – Conduct chemistry analysis of the subsurface sediment in English Kills and the Turning Basin in Newtown Creek.
- **Confirmation and Delineation of NAPL –** Conduct visual observations on four subsurface sediment locations in English Kills and use of refined sediment core logging procedures during Phase 2 to help confirm the presence of NAPL in sediments and develop and implement a NAPL delineation program based on the results of the confirmation program (if needed).

Sediment coring stations will be sampled for a designated list of parameters. Table B9-3 provides the sampling stations, rationale for each station, and planned analyses for each location. Table B9-4 provides the analyses, volume/container requirements, and laboratory information. Figures B9-2a through B9-2f show the proposed sampling locations for the surface and subsurface sediment and native material sampling programs. These stations may be adjusted based on the results of the identification of potential utilities or other hazards within the Study Area and/or field conditions. If a station needs to be moved more than 200 feet parallel to the shoreline and/or 50 feet perpendicular to the shoreline, USEPA will be notified prior to sampling. A log of the rationale for significantly moving any station will be maintained and included in monthly status reports to USEPA.

The following subsections describe the summary of each sediment core sampling field program (additional details are presented in Table B9-3).

9.2.1.1 High-Resolution Sample Intervals

Sediment cores will be collected from 12 locations shown on Figure B9-2a and will be sampled for chemical and physical characterization in 2-cm intervals from 0 to 60 cm (0 to 2 feet) below the mudline, as shown in Table B9-3. Up to 15 samples from each station will be selected for analysis; all remaining samples will be archived.

9.2.1.2 Geochronology and Chemistry Sampling

Subsurface sediment samples will be collected for geochronology and/or chemical testing from 14 locations based on the group type shown on Figure B9-2b and in Table B9-3. For the ten Group A locations, two geochronology cores will be collected and processed in 2-cm intervals from 0 cm to the top of the native material, as measured below the mudline. A subset of samples from the highest quality core from each station will be selected for analysis; all remaining samples will be archived.

For the four Group B locations, two geochronology cores will be sampled consistent with the Group A program; additionally, three sediment cores will be collected for chemical and physical characterization. Cores for chemistry analysis will be sampled in 30-cm intervals from 15 cm down to 4 meters below the mudline. A co-located surface sediment grab will be collected at each station as described in the Phase 2 FSAP Volume 1. The proposed locations of the Group B cores and grabs target relatively shallow bed areas located adjacent to point source discharges (e.g., sediment mounds). If an acceptable sample cannot be collected at the proposed station, the field team will use a lead line and bathymetry to move within the surrounding area of relatively shallow water to ensure the sample is collected within a sediment mound near the point source discharge. A subset of sample intervals from each station will be selected for analysis; all remaining samples will be archived.

Additionally, as part of this program, archived Phase 1 geochronology samples will be submitted to the laboratory for analysis consistent with Phase 1 procedures. The Phase 1 locations and number of samples to be submitted for analysis are presented in the Phase 2 RI Work Plan Volume 2 Table 7-3.

9.2.1.3 New York City Post-Dredge Areas Sampling

Subsurface sediment samples will be collected for chemical testing from ten locations within the areas to be dredged by NYC after the construction work is complete, as shown on Figure B9-2c. Based on visual observations of the core, two sample intervals (one from the sand cover material, and one from below the sand cover material) will be analyzed for the Phase 2 sediment chemistry list shown in Table B9-3.

9.2.1.4 Vertical Extent of Contamination

A subsurface sediment and native material core will be collected for visual observation of depth to native material and chemistry analysis of the native material at one location near the mouth of Newtown Creek shown on Figure B9-2d and in Table B9-3. The core will be collected with direct-push methodology using the sediment core collection portion of the procedures detailed in the Phase 2 FSAP Volume 2 Addendum and Phase 2 QAPP Version 3 that are currently in progress.

9.2.1.5 Refinement of Vertical Contaminant Distribution

Archived cores from three locations in the English Kills (EK003, EK004, and EK005) will be pulled from storage and thawed for visual observations. The cores will be logged as described in SOP NC-20 – Sediment and Native Material Core Processing, with shake tests performed on two to four samples at and below the sediment/native material interface in more discrete intervals than were sampled during Phase 1 based on the procedures outlined in the shake test procedure in SOP NC-21 – Sediment-Water Shake Test and the Flow Diagram for Field Identification of NAPL (see Attachment 3 of SOP NC-20). The locations of the Phase 1 archived cores to be processed in Phase 2 are shown on Figure B9-2e and described in Table B9-3.

9.2.1.6 Confirmation of Contaminant Distribution in Unique Areas

Subsurface sediment samples will be collected for chemical testing from nine locations within English Kills and seven locations within the Turning Basin of Newtown Creek as shown on Figure B9-2f. Cores will be collected consistent with the Phase 1 subsurface sediment procedures and will be analyzed for the Phase 2 sediment chemistry list shown in Table B9-3. A co-located surface sediment grab will be collected at each station as described in Section 9.1.

Subsurface sediment samples for confirmation of contaminant distribution will be collected for chemical and physical characterization from each core according to the following segmentation scheme (as measured below the mudline):

- 15 to 60 cm
- 60 to 100 cm
- 100 to 200 cm
- 200 to 300 cm
- 300 to 400 cm
- 400 cm to the top of the native soil unit (if encountered)
- 500 cm to the top of native soil unit (if the depth to native soil unit exceeds 500 cm, the previous sample will be from 400 to 500 cm and this sample will be from 500 cm to the native soil unit)
- Native soil unit (silt/clay) in approximately 100-cm sections

Where the native soil unit is encountered at a shallower depth, fewer samples will be collected (e.g., if the native materials are encountered at 260 cm below mudline, a sediment sample would be collected from the 200- to 260-cm interval, followed by a sample of the native materials). Sample intervals 100 cm or greater in thickness may be adjusted where a stratigraphic change in the sediment sequence (e.g., change in lithology and/or depositional boundary contacts) is observed within a sample interval. Where there is a lithological change (i.e., native contact) and the interval is less than 50-cm thick, that interval will be added to the adjacent sample interval. For example, if the native contact is at 130 cm below the mudline, sampling intervals will be designated as 60 to 130 cm and 130 cm to the next contact. If the interval is greater than 50-cm thick, the remainder of that interval will be added to the sample below. For example, if the native contact is at 180 cm, sampling intervals will be designated as 100 to 180 cm and 180 cm to the next interval.

9.2.1.7 Confirmation and Delineation of NAPL

Four subsurface sediment and native material cores will be collected for visual observation of NAPL in English Kills shown on Figure B9-2g and detailed in Table B9-3. The cores will be logged as described in SOP NC-20 – Sediment and Native Material Core Processing, with shake tests performed on visually impacted sediment and native material based on the procedures outlined in the shake test procedure in SOP NC-21 – Sediment-Water Shake Test and the Flow Diagram for Field Identification of NAPL (see Attachment 3 of SOP NC-20).

Based on the results of sediment core logging for the various subsurface sediment and native material programs, for those cores where NAPL is confirmed, nearby Phase 1 archived cores may be considered for evaluation using core logging procedures to help delineate NAPL extent. If NAPL is confirmed to be present in the Phase 1 archived cores and further delineation is determined to be necessary to better define the lateral extent, a Phase 2 NAPL delineation coring program will subsequently be developed and implemented in coordination with USEPA.

9.2.2 Procedures

Sediment core sampling and processing activities for subsurface samples are described in the following sections. All of the tasks described in this section will be documented and stored in the project files as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2). During on-water sampling activities, shoreline and waterbody conditions will be documented. Field notes will be maintained on the Daily Log (see SOP NC-01 – Field Records for sample form), and on data collection forms (see SOP NC-19 – Sediment and Native Material Core Collection) during the sampling period. Photographs will be taken of the subsurface sediment and any significant observations made during sampling.

Sediment cores will be advanced to specified depths as presented in Table B9-3, depending on the objective of the sample collection. Up to three attempts will be made at each location (see SOP NC-19 – Sediment and Native Material Core Collection). If the first attempt does not yield an acceptable core, then up to two alternate stations will be attempted within 50 feet perpendicular to the shoreline and 200 feet parallel to the shoreline. One attempt at sample collection will be made at the first alternate station. If this attempt does not yield an acceptable sample, then one attempt will be made at the second alternate station. If sample acceptance criteria are not achieved after three attempts, then acceptance criteria might be modified by the Field Team Leader to allow one or more of the three attempts to be processed or the station is to be abandoned.

For all sediment core programs, a sufficient number of cores will be collected to provide sufficient sediment volume to fill the required analytical bottles for the sample station. Table B9-4 includes a summary of the sample volumes and containers required for each analyte.

Also during sediment core sampling and other Phase 2 sampling activities, human recreational use of the Study Area will be documented. The types of potential recreational activities that the field team staff will record include kayaking or other noncommercial water craft on the water, SCUBA diving, swimming or wading activities, fishing from on the water or from the shore, and crabbing along the shore. These visual observations will be recorded on the Visual Observation Log (see SOP NC-01 – Field Records for example form).

9.2.2.1 Pre-Sampling Activities

Pre-sampling activities will be completed prior to initiating sediment core sampling, and include the following:

- Ensuring that required permits and notifications for the type of sampling and stations within the Study Area have been submitted and approved for the day's activities (see Table B3-1 of the Phase 2 FSAP Volume 1)
- Reviewing Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate PPE, and safety meetings to be conducted prior to field work
- Obtaining utility locations for the sampling period and area within the Study Area, ensuring that all utility crossings have been identified (see Section 3 of Phase 2 FSAP Volume 1), and relocating any station that is within 30 feet vertically or 50 feet horizontally from any utilities or related infrastructure
- Identifying the type of boat for sampling based on logistical constraints due to bridges and tides: The Field Manager will provide pertinent information, including contact telephone numbers for each of the moveable bridges. A large boat will be used to complete coring operations, but a small-sized boat or a crane lift may be necessary for some areas of the Study Area, including Dutch Kills where access may be limited by fixed bridge clearance and tributary headwaters where floatable containment booms and areas of sediment accumulation will limit access to a small-sized boat. In areas of extreme access limitation, every practical effort will be made to retrieve a sample, but some locations may have to be abandoned due to logistical constraints.
- Checking tide charts for water-level conditions throughout the sampling period
- Checking weather conditions for the day prior to leaving the dock and throughout the day for changing conditions
- Calibrating the PID based on manufacturer's instructions for use in the processing area
- Preparing a daily float plan listing a plan for communication between the land-side and boat-based field team staff, the stations to be sampled, target station coordinates, access points along the Study Area, sample transfer/transport locations, and estimated coring depths; target coordinates should be pre-loaded into a DGPS unit
- Obtaining final sample table from the Project Chemist/Field Manager that will be compiled for each sampling mobilization and organized by station: This table will include station number, analyses to be conducted, QA/QC samples required, holding times, preservation, and laboratory address. USEPA will be notified 2 weeks (minimum) in advance of sampling and provided a copy of the final sample table. If

USEPA has requested split sampling, this notification will be made 3 weeks (minimum) prior to sampling.

- Checking that both water-level pressure transducers are working properly

9.2.2.2 Sampling Activities

It is anticipated that the boat crew for core collection activities will consist of approximately four field team staff, including a boat captain and crew member and two members of the sampling team. The sampling vessel will also accommodate USEPA personnel, USEPA contractor personnel for oversight, NYSDEC personnel, and representatives of the NCG for observation. Anchor QEA will be notified at least 1 week prior to any vessel oversight in order to make the appropriate accommodations. The boat crew will be in constant communication with the Field Team Leader during sampling activities. The boat staff and crew will meet health and safety requirements as specified in the Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2).

On each day of sediment core sampling, the designated field team staff will check in with the Field Team Leader to confirm the schedule and locations to be sampled and collect the appropriate communications equipment. In addition to the daily safety meeting conducted by the POSO, a health and safety meeting will be performed by the boat captain prior to boarding the boat. Prior to leaving the dock, the POSO or a designee will confirm that the captain has completed an inspection of the boat, including an inventory of required safety gear (i.e., personal floatation devices and radios), has conducted a communications check, and has filed a daily float plan.

The following activities and sampling procedures will be implemented for sediment core collection:

- Pre-cleaned sampling equipment will be loaded on the boat, including decontamination fluids/equipment, IDW containers, and core storage racks that will hold cores vertical and cold during temporary storage on board the boat, and fresh ice will be placed in the core racks.

- The boat will be navigated to the target location. The boat will be positioned and secured at the target station using procedures described in SOP NC-03 – Navigation and Boat Positioning.
- Survey coordinates (horizontal datum in NAD83 using NYLI) will be recorded for each sample attempt on the sediment core collection form included in SOP NC-19 – Sediment and Native Material Core Collection. Data will be collected with an external Trimble GeoXH GPS receiver, or similar, capable of sub-meter accuracy.
- Sediment cores will be collected at each location by using either sonic drilling or vibracoring techniques depending on the sample objective as detailed in Table B9-3. The corer will be lowered slowly to the sediment surface and allowed to penetrate into the sediment and then vibrated as little as possible. Drilling and vibracoring sampling procedures are detailed in SOP NC-19 – Sediment and Native Material Core Collection.
- Once the core is retrieved, the field team staff will evaluate whether the core is acceptable to be retained for processing (i.e., sediment penetration depth and recovery percentage are adequate) per SOP NC-19 – Sediment and Native Material Core Collection. If acceptable, the core will be retained for sample collection. At some locations, more than one attempt may be required to obtain an acceptable core.
- At each station, sufficient core volume will be obtained for the parameters that will be analyzed at that station, including QA/QC samples (see Table B9-4 and USEPA-required samples).
- The cores will be kept as upright as possible and as described in SOP NC-19 – Sediment and Native Material Core Collection. The core will then be capped.
- The cores will be segmented into sections of 6 feet or less as required for transport and placed on ice pending transfer to the sample processing area. Each core segment will be labeled with: 1) the station ID; 2) top and bottom; and 3) sequence (A, B, C, etc.). Core segments will be kept as vertical as possible at all times pending processing.
- All material from unacceptable cores, decontamination fluids, and used PPE will be containerized as IDW and disposed of according to SOP NC-08 – Investigation-Derived Waste Handling and Disposal.
- All field activities will be documented, including core collection activities, and the core collection log will be filled out in its entirety. Field documentation procedures

are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Sampling data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files. At the end of the day and between each station, all sampling equipment will be decontaminated per SOP NC-02 – Equipment Decontamination.

9.2.2.3 Sample Processing

Sediment cores will be held at the field facility and processed as presented in the following and in greater detail in SOP NC-20 – Sediment and Native Material Core Processing. Sampling nomenclature is presented in Section 9.2.2.5 and sample analysis is presented in Section 9.2.2.6.

- The segmented cores (6 feet or less) will be stored in an upright position in a cooler at 4 °C until ready for processing.
- New plastic sheeting, or aluminum foil, will be placed on sample processing surfaces prior to processing a core from a new station.
- Excess water in the cores will be removed prior to further processing (see SOP NC-20 – Sediment and Native Material Core Processing).
- The core will be split into longitudinal halves by inserting a decontaminated, flat-blade tool (spatula or putty knife) into each sediment interval through the cuts in the core liner. Use one tool for each sample interval, being careful not to cross-contaminate adjacent intervals. Open the tube lengthwise, carefully separating the core half-sections, and align them on the plastic sheeting.
- The length of the core will be screened with a PID and the results recorded on the sediment core processing log.
- Sediments in each core segment will be logged using the USCS and information recorded on a lithology record (sample provided in SOP NC-20 – Sediment and Native Material Core Processing) that will include primary grain size, minor constituents, color, consistency, odors, and visible evidence of impacts (e.g., sheen). If visual evidence of impacts are observed, additional tests may be performed as described in SOP NC-20 – Sediment and Native Material Core Processing.

- A photographic log will be kept of each core segment. For each core segment, a representative photograph will be taken with a place card of the sample station and sample interval and date, and a ruler will be visible in the photograph.
- Core samples for general chemistry and physical parameters will be processed using procedures detailed in SOP NC-20 – Sediment and Native Material Core Processing. Archive samples will be collected from each homogenized interval for subsequent analysis.
- Samples will then be placed in the appropriate laboratory-provided sample containers (refer to sample table provided by the Project Chemist/Field Manager).
- Once samples are prepared, the samples will be checked and information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody. Sample containers will be placed in a secure, refrigerated (4 °C) area pending shipment to the analytical laboratory per SOP NC-07 – Sample Packaging and Shipping. Sample handling and shipping procedures are discussed in Section 13.2.3 of Phase 2 FSAP Volume 1.
- All field activities will be documented including sample processing procedures, sample collection and COC, and shipment to the laboratories. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Processing data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files.
- At the end of the day and between sample intervals, all processing equipment will be decontaminated per SOP NC-02 – Equipment Decontamination prior to use.

9.2.2.4 Sampling Location and Frequency

Sample stations are shown on Figures B9-2a through B9-2f. The Phase 2 RI Volume 2 field program includes one round of sediment sonic/vibracore drilling including the following locations:

- Twelve locations for high-resolution sample intervals
- Fourteen locations for additional geochronology and chemistry

- Ten locations for evaluation of post-dredging conditions in areas to be dredged by NYC
- One location for vertical extent of contamination
- Three locations in English Kills to refine vertical contaminant extent at the sediment/native material interface using archived cores where contaminants were observed in the native material
- Sixteen locations for confirmation of contaminant distribution in sediment
- Four locations for confirmation and delineation of NAPL, as well as additional archive analysis or new locations as necessary

9.2.2.5 Sample Designation

Samples will be uniquely identified at the time of collection as described in Section 13.2.1 of Phase 2 FSAP Volume 1. Nomenclature is {station identification}{matrix code}{sequence}-{depth}-{date} where:

- Station identification = a five-character identifier for the station identified on Figures B9-2a through B9-2f. The identifier will begin with a two-character identifier to indicate whether the station is located in Newtown Creek or a tributary and will be followed by a three-digit number that indicates the position. Field duplicates will be identified by adding 1000 to the three-digit position number. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- Rinsate and trip blanks will not require a station identifier.
- Matrix code = a two-character code to indicate the sample matrix. Matrix codes are as follows:
  - SC = chemistry sediment core
  - RB = rinsate blank
  - TB = trip blank

- Sequential cores collected at the same location on the same day will include letters (A, B, C, etc.) noting the sequence in which they were collected.
- Depth, sediment samples = a six-character identifier indicating the depth in cm from where the samples were collected.
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD.

The following are examples:

- The first chemistry core sample collected at the 26th station of the Newtown Creek area with a depth of 198 to 297 cm collected on September 8, 2014, would have the following ID: NC026SCA-198297-20140908.
- The duplicate of this sample would have the following ID: NC1026SCA-198297-20140908.
- A rinsate blank collected in association with chemistry core sampling collected on June 1, 2014, would have the following ID: SC-RB-20140601.

9.2.2.6 Sample Handling and Analysis

Sediment core samples will be analyzed for a broad list of constituents identified in Table B9-3. Samples will be packaged and shipped to the laboratory in accordance with SOP NC-07 – Sample Packaging and Shipping (see Section 13.2.3 of Phase 2 FSAP Volume 1). Table B9-4 provides the list of analyses, containers, sample size, and laboratory information. Further information on the analytical program and specific analytes are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

9.2.2.7 Equipment Decontamination

Sediment core sampling equipment will be in contact with Study Area media and, therefore, will require decontamination. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

9.2.2.8 Investigation-Derived Waste

IDW will be generated during the performance of the sediment sampling and coring and during equipment decontamination. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

9.2.2.9 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning
- NC-04 – Photoionization Detector Calibration and Operation
- NC-06 – Sample Custody
- NC-07 – Sample Packaging and Shipping
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-19 – Sediment and Native Material Core Collection
- NC-20 – Sediment and Native Material Core Processing
- NC-21 – Sediment-Water Shake Test

9.2.3 Data Processing, Analysis, and Management

Electronic data collection records from sediment core sampling activities, including sample collection, processing, and sample management, will be downloaded as soon as possible and saved to the electronic project files. Paper records will be scanned and sent to the Data Management Task Manager. Survey data will be loaded into a GIS-based spatial database and added to the Study Area basemap.

Analytical data will be validated as described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). Analytical data will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

9.2.4 Reporting

Information obtained during sediment core sampling and processing activities for sediment chemistry and physical characterization will be included in the RI report and other deliverables, as appropriate.

9.2.5 Schedule

Phase 2 RI field program sediment core sampling activities are planned to be conducted in multiple sequential field mobilizations based on drilling methodology. It is anticipated that this sampling effort will be conducted during the summer of 2014. The schedule will be dependent on weather and field conditions.

9.3 In-Creek Sediment Traps

This section describes the procedures that will be followed to perform the sediment trap program. The scope development activities for this work are provided in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2).

9.3.1 Overview

The following sections present a summary of the sediment trap program including the purpose and summary of work to be completed during Phase 2.

Purpose. The overall objective of the sediment trap program is to measure gross chemical deposition fluxes and characterize the chemical constituents of newly depositing sediment. Specific objectives include the following:

- Identify temporal and spatial trends in chemical concentrations of newly deposited sediment throughout Newtown Creek.
- Measure temporal and spatial changes in the chemical deposition flux and physical characteristics of sediment currently depositing within the creek.

Summary of Work to be Performed during Phase 2. The Phase 2 objectives in the Phase 2 RI Work Plan Volume 2 will be addressed by conducting sediment trap sampling throughout the Study Area. Sediment trap stations will be sampled for a designated list of parameters as discussed in Table B9-5, which provides the sampling stations and analytes/analyte groups for each station. Figure B9-3 shows the sediment trap sampling stations within the Study Area.

9.3.2 Procedures

This section will provide a description of the procedures that will be employed to carry out the sediment trap program.

Also during sediment trap deployment and maintenance and other Phase 2 sampling activities, human recreational use of the Study Area will be documented. The types of potential recreational activities that the field team staff will record include kayaking or other noncommercial water craft on the water, SCUBA diving, swimming or wading activities, fishing from on the water or from the shore, and crabbing along the shore. These visual observations will be recorded on the Visual Observation Log (see SOP NC-01 – Field Records for example form).

9.3.2.1 Pre-Sampling Activities

Pre-sampling activities will be completed prior to deployment and maintenance of sediment traps and include the following:

- Ensuring that required permits and notifications for the type of sampling and stations within the Study Area have been submitted and approved for the day's activities (see Table B3-1 of the Phase 2 FSAP Volume 1)
- Reviewing Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) for potential hazards, appropriate PPE, and safety meetings to be conducted prior to field work
- Obtaining utility locations for the sampling period and area within the Study Area, ensuring that all utility crossings have been identified (see Section 3 of Phase 2 FSAP Volume 1)
- Identifying the type of boat for sampling based on logistical constraints due to bridges and tides: The Field Manager will provide pertinent information, including contact telephone numbers for each of the moveable bridges.
- Checking tide charts for water-level conditions throughout the sampling period

- Checking weather conditions for the day prior to leaving the dock and throughout the day for changing conditions
- Calibrating the PID and H_2S meter for use on board the boat
- Preparing a daily float plan listing a plan for communication between the land-side and boat-based field team staff, the stations to be sampled, target station coordinates, access points along the Study Area, and sample transfer/transport locations; target coordinates should be pre-loaded into a DGPS unit
- Obtaining final sample table from the Project Chemist/Field Manager that will be compiled for each sampling mobilization and organized by station: This table will include station number, analyses to be conducted, QA/QC samples required, holding times, preservation, and laboratory address. USEPA will be notified 2 weeks (minimum) in advance of sampling and provided a copy of the final sample table. If USEPA has requested split sampling, this notification will be made 3 weeks (minimum) prior to sampling.
- Checking that both water-level pressure transducers are working properly for use in calculating water levels in the Study Area

9.3.2.2 Sampling Activities

The sediment traps will be deployed in accordance with SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps, as summarized in this section. It is anticipated that the boat crew for sediment trap activities will consist of approximately five field team staff, including a boat captain and four members of the sampling team. The sampling vessel will also accommodate USEPA personnel, USEPA contractor personnel for oversight, NYSDEC personnel, and representatives of the NCG for observation. Anchor QEA will be notified at least 1 week prior to any vessel oversight in order to make the appropriate accommodations. The boat crew will be in constant communication with the Field Team Leader during sampling activities. The boat staff and crew will meet health and safety requirements as specified in the Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2). At each location, four traps will be placed on the surface of the sediment bed. One of the traps will be used to provide samples for physical characteristics and the other three traps will be used to provide samples for chemical characteristics.

On each day of sediment trap sampling, the designated field team staff will check in with the Field Team Leader to confirm the schedule and locations to be sampled and collect the appropriate communications equipment. In addition to the daily safety meeting conducted by the POSO, a health and safety meeting will be performed by the boat captain prior to boarding the boat. Prior to leaving the dock, the POSO or a designee will confirm that the captain has completed an inspection of the boat, including an inventory of required safety gear (i.e., personal floatation devices and radios), has conducted a communications check, and has filed a daily float plan.

The following activities and sampling procedures will be implemented for sediment trap deployment:

- The boat will be navigated to the target location. The boat will be positioned and secured at the target station using procedures described in SOP NC-03 – Navigation and Boat Positioning.
- Survey coordinates (horizontal datum in NAD83 using NYLI) will be recorded for each deployment location on the Sediment Trap Deployment and Retrieval Form included in SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps. Data will be collected with an external Trimble GeoXH GPS receiver, or similar, capable of sub-meter accuracy.
- The traps will be lowered gently to the bottom of the creek, and allowed to rest on an approximately level area.
- Small surface floats may be attached to the traps to facilitate locating them during future sampling events, depending on local field conditions. An underwater video system may also be used to assist in the deployment and retrieval of the sediment traps.
- All field activities will be documented; the Sediment Trap Deployment and Retrieval Form will be filled out in its entirety. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Sampling data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files. At the end of the day and between each station, all sampling equipment will be decontaminated per SOP NC-02 – Equipment Decontamination.

The following activities and sampling procedures will be implemented for sediment trap retrieval:

- The boat will be navigated to the trap location. The boat will be positioned and secured at the trap station using procedures described in SOP NC-03 – Navigation and Boat Positioning.
- Survey coordinates (horizontal datum in NAD83 using NYLI) will be recorded for each trap location on the Sediment Trap Deployment and Retrieval Form included in SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps. Data will be collected with an external Trimble GeoXH GPS receiver, or similar, capable of sub-meter accuracy.
- The trap will be raised to the surface by lifting gently on the rope attached to the surface buoy. Alternately, the trap may be located with an underwater video system and brought to the surface by hooking the looped handle with an extendable pole equipped with a hook. The design of the handle keeps the traps from tipping while being raised.

9.3.2.3 Sample Processing

Sediment trap samples will be processed on the boat as presented in the following and in greater detail in SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps. Sampling nomenclature is presented in Section 9.3.2.5 and sample analysis is presented in Section 9.3.2.6.

- Once aboard the sampling vessel, the water in the trap will be decanted to the point where no more can be poured off without losing the captured sediment.
- The sample will be screened with a PID. Readings will be recorded manually or electronically using the Field Scribe program on the Sediment Trap Deployment and Retrieval Form (see SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps).
- Sediments in each trap will be logged using the USCS and information recorded on a Sediment Trap Deployment and Retrieval Form (provided in SOP NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps) that will include primary grain size, minor constituents, color, consistency, odors, and visible evidence of impacts (e.g., sheen).

- A photographic log will be kept of each trap sample. For each sample, a representative photograph will be taken with a place card of the sampling location, sample interval, and date, and a ruler will be visible in the photograph.
- If mass sufficient for sample collection is present in the collected trap(s), sediment will be composited from individual traps and samples will be placed in the appropriate laboratory-provided sample containers as detailed in Table B9-6.
- Once samples are prepared, the samples will be checked and information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody. Sample containers will be placed in a secure, refrigerated (4 °C) area pending shipment to the analytical laboratory per SOP NC-07 – Sample Packaging and Shipping. Sample handling and shipping procedures are discussed in Section 13.2.3 of Phase 2 FSAP Volume 1.
- All field activities will be documented including sample processing procedures, sample collection and COC, and shipment to the laboratories. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records.
- Processing data and field records/forms will be reviewed by the Field Team Leader, scanned, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files.
- At the end of the day and between sample intervals, all processing equipment will be decontaminated per SOP NC-02 – Equipment Decontamination prior to use.

9.3.2.4 Sampling Location and Frequency

The physical sediment trap at each location will be inspected monthly and chemical sediment traps will be inspected every 3 months. The contents of the physical sediment trap will be submitted to the laboratory for archiving every month. Depending on the amount of sediment present in the three chemical traps at each location, the contents will be collected, composited as necessary, and sent for analysis quarterly. Three quarterly rounds (i.e., every 3 months) of sediment trap samples will be collected from the 30 locations presented on Figure B9-3.

9.3.2.5 Sample Designation

Samples will be uniquely identified at the time of collection as described in Section 13.2.1 of Phase 2 FSAP Volume 1. The nomenclature that will be used is {station identification}{matrix code}-{date} where:

- Station identification = a five-character identifier for the station identified on Figure B9-3. The identifier will begin with a two-character identifier to indicate whether the station is located in Newtown Creek or a tributary and will be followed by a three-digit number that indicates the position. Field duplicates will be identified by adding 1000 to the three-digit position number. The character codes are as follows:
  - NC = Newtown Creek
  - DK = Dutch Kills
  - WC = Whale Creek
  - MC = Maspeth Creek
  - EB = East Branch
  - EK = English Kills
- Rinsate and trip blanks will not require a station identifier.
- Matrix code = a two-character code to indicate the sample matrix. Matrix codes are as follows:
  - ST = sediment trap
  - RB = rinsate blank
  - TB = trip blank
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD.

The following are examples:

- A sediment trap sample collected for chemical analysis at the 26th station of the main Newtown Creek area collected on September 8, 2013, would have the following ID: NC026ST-20130908. The duplicate of this surface grab sample would have the following ID: NC1026ST-20130908.

- A rinsate blank collected in association with sediment grab sampling collected on June 1, 2014, would have the following ID: ST-RB-20140601.

9.3.2.6 Sample Handling and Analysis

The physical sediment traps will be retrieved approximately once per month, and the mass of solids (dry-weight basis) will be measured at the laboratory. After this analysis is complete, the dried sample will be archived at the laboratory. The archived samples from each location will be composited every 3 months, and these composite samples will be submitted for grain size analysis (as sample volume permits).

The chemical sediment traps will be inspected approximately every 3 months and assessed visually to determine whether there is sufficient sample volume present for chemistry analyses. If sufficient sample volume is present, the contents will be collected, composited among the three individual traps as necessary, and submitted for the analyses presented in Table B9-5. If it is determined that the sample volume is insufficient, the sediment will be left in the traps, and the traps will be redeployed for another month. If after the additional month, the sample volume collected is still insufficient for the analyses of the entire list of analytes in the Phase 2 sediment trap sampling program, a priority list will be used. The priority list includes a subset of analyses to be conducted first, labeled as list A in Table B9-6, and includes the following: polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, and total organic carbon (TOC). If the volume collected is insufficient for this list as well, then the laboratory analyses will proceed in an adaptive manner. Based on the analyses of an initial subset of samples, subsequent samples may be diluted if adequate detection limits can still be achieved. This will result in a reduction in sample volume requirements and may permit analyses of more or all of the priority analyses.

Up to three samples from each physical characteristics trap and up to three samples from each chemical characteristics trap will be submitted for laboratory analysis, resulting in up to approximately 90 samples for mass of solids, grain size, TOC, and sediment chemistry analysis.

9.3.2.7 Equipment Decontamination

Sediment trap sampling equipment will be in contact with site media, and therefore, will require decontamination. Decontamination of the equipment will be performed in accordance with the procedures described in SOP NC-02 – Equipment Decontamination.

9.3.2.8 Investigation-Derived Waste

IDW will be generated during the performance of the sediment trap sampling and during equipment decontamination. Cleaning and decontamination of equipment will be conducted between sampling locations. Used PPE will also be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

9.3.2.9 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-03 – Navigation and Boat Positioning
- NC-04 – Photoionization Detector Calibration and Operation
- NC-06 – Sample Custody
- NC-07 – Sample Packaging and Shipping
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-22 – Surface Sediment Sampling Using In-Creek Sediment Traps

9.3.3 Data Processing, Analysis, and Management

Data collection records from sediment trap sampling activities, including sample collection, processing, and sample management, will be downloaded as soon as possible and saved to the electronic project files. Paper records will be scanned and sent to the Data Management Task Manager. Survey data will be loaded into a GIS-based spatial database and added to the Study Area basemap.

Analytical data will be validated as described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). Analytical data will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

9.3.4 Reporting

Information obtained during sediment trap sampling activities for sediment chemistry and physical characterization will be included in the RI report and other deliverables, as appropriate.

9.3.5 Schedule

The sediment traps will be deployed for a 9-month period starting in spring or early summer of 2014 to allow for an assessment of seasonal changes in sediment composition and gross deposition fluxes. The physical traps will be inspected approximately once per month, samples from each location will be composited every 3 months, and these composite samples will be submitted for grain size analysis (as sample volume permits). The chemical traps will be inspected approximately every 3 months and assessed visually to determine whether sufficient mass is present for analyses. Also, if at the end of the program it is determined that more data are required, the sediment traps may be deployed for an additional 3 months.

10 POINT SOURCE DISCHARGES (VOLUME 2)

This section describes the procedures for the point sources sampling activities. The development of the approach for the point sources sampling is detailed in the *Sources Sampling Approach Memorandum* (SSAM; see Appendix E of the Phase 2 RI Work Plan Volumes 1 and 2). Additional details for the point sources methods described in this section are provided in SOPs NC-23 through NC-30 and SOPs NC-36 and NC-37. It is anticipated that details of the Phase 2 point sources program may be further refined based on information gathered during additional reconnaissance of proposed sampling locations prior to the implementation of the Phase 2 RI Work Plan Volume 2. Proposed refinements will be submitted to USEPA as addenda.

10.1 Overview

The following sections present a summary of the point sources sampling program including the purpose, point source categories, selection of sampling locations to achieve the objectives of the program, and summary of work to be completed during Phase 2.

Purpose. Sampling of point sources discharging to the Study Area and its tributaries will be conducted to meet the following objectives:

- Obtain data that can be used to evaluate the composition of potentially significant point source discharges to the Study Area.
- Develop an improved understanding of the relative magnitude and the spatial and temporal variations in point source discharges to the Study Area, which will be used to refine elements of the conceptual site model and risk assessments, and evaluate remedial alternatives.

Point Sources Categories. As presented in the SSAM and Phase 2 RI Work Plan Volumes 1 and 2, point sources were grouped into categories to aid in the selection of targeted sampling locations and estimation of point source loadings[1] to the creek. The categories are described

[1] Point source loads to be evaluated during Phase 2 include total organic carbon (TOC), solids, and contaminants.

below and additional details for each of the categories are provided in Section 5.2.1 of the Phase 2 RI Work Plan Volume 2.

In summary, Category 1 discharges are individually permitted stormwater and wastewater discharges including direct discharges of wastewater, and/or industrial stormwater that are not regulated by a general permit. Category 2 discharges include discharges from the combined sewer system and treated effluent from the Newtown Creek Water Pollution Control Plant (WPCP)[2]. Combined sewer discharges contain stormwater and wastewater including sewage and industrial wastewater. The Newtown Creek WPCP high flow relief Outfall NCB-002 discharges treated stormwater and wastewater. The following sub-categories were established within Category 2: Category 2A – Combined Sewer Discharges and Category 2B – WPCP Treated Effluent. Category 2 discharges occur when the capacity of the combined system or WPCP is exceeded during a storm event. Category 3 discharges include stormwater discharges that are permitted under a municipal or general permit program, as well as stormwater discharges that are not regulated. These discharges include point source discharges from individual sites directly to the creek, point source discharges from municipal infrastructure to the creek, or a combination of both. The majority of the more than 300 outfalls that have been identified on the creek are Category 3 stormwater outfalls, some of which may be abandoned or no longer active. The following sub-categories were established within Category 3: Category 3A – Municipal Separate Storm Sewer System (MS4) and Major Stormwater Discharges; Category 3B – Highway Drains; and Category 3C – Direct Discharges from Individual Sites.

Selection of Sampling Locations to Achieve Program Objectives. As discussed in the SSAM (see Appendix E of the Phase 2 RI Work Plan Volumes 1 and 2) and Phase 2 RI Work Plan Volume 2, the purpose of the point sources sampling program is to provide data that can be used to evaluate and quantify loads from point source discharges to the Study Area. Although it is not necessary to obtain direct measurements of every point source discharge to the creek in order to support an FS-level analysis of remedial alternatives, the sampling

[2] Historically, the New York City Department of Environmental Protection (NYCDEP) and the New York State Department of Environmental Conservation (NYSDEC) used the term Water Pollution Control Plant (WPCP); however, in the 2012 modified permits, these facilities are referred to as Wastewater Treatment Plants (WWTPs).

program will include outfalls chosen to represent approximately 84 percent of the total estimated volume of annual point source discharge and overland flow to the creek.

Point source sampling locations were selected in order to: 1) target a reasonable subset of discharges within each point sources category to develop representative loadings for other discharges that will not be sampled during this effort; and 2) target unique discharges that may represent a potentially significant loading to the creek. Additional information regarding the sampling location selection rationale is described in Section 5.2.1.1 of the Phase 2 RI Work Plan Volume 2.

Summary of Work to be Performed during Phase 2. Whole-water, bulk-water, WPCP influent, and discrete TSS sampling will be conducted to achieve the objectives outlined in this section. The rationale for the selected sampling methods is detailed in Section 5.2.1.1 of the Phase 2 RI Work Plan Volume 2. The general procedures for point sources sampling, including preparation and sample processing, are summarized in Section 10.2 and are detailed in SOPs NC-23 through NC-30 and SOPs NC-36 and NC-37. In total, samples will be collected from 33 sampling locations at 32 point source discharges and one additional location (the influent at the Newtown Creek WPCP) as summarized in Tables B10-1 through B10-3.

It is anticipated that the details of the Phase 2 point sources program may be further refined prior to implementation of the field program based on information gathered during reconnaissance of proposed sampling locations.

10.2 Procedures

As noted above, the Phase 2 point sources sampling effort will include the collection of whole-water samples, bulk-water samples, WPCP influent samples, and discrete TSS samples.

As described in further detail below in Section 10.2.2.1, whole-water samples will be collected using the following sampling methods, based on the results of the field reconnaissance activities:

- Manual composite sampling
- Sheetflow manual composite sampling
- Grab sampling

Grab sampling can be further divided into dry-weather grab sampling and grab composite sampling.

Bulk-water samples will be collected using a high-volume grab sampling method, as detailed in Section 10.2.2.2.

WPCP influent samples will be collected during both wet-weather and dry-weather conditions. The WPCP influent sampling will be conducted as described in Section 10.2.2.3.

As described in Section 10.2.2.4, discrete samples to be analyzed for TSS will be collected every 15 minutes during the storm duration at a subset of the sampling locations using the whole-water manual composite sampling method.

Additional details including the specific types of sampling equipment to be used are presented in SOPs NC-23 through NC-28 and SOPs NC-36 and NC-37 (see Attachment 1). Additionally, Tables B10-1 through B10-3 summarize the point source sampling elements for each of the targeted Category 1, Category 2, and Category 3 sampling locations, respectively. The sampling locations and the sampling methods to be used at each location are also shown on Figure B10-1.

10.2.1 Pre-Sampling Activities

Pre-sampling activities to be completed prior to initiation of sampling are described in the following sections and may be modified during the Phase 2 sampling program as needed.

10.2.1.1 Location-Specific Sampling Package Preparation

Prior to the start of the point sources sampling program, a location-specific sampling package will be developed for each targeted sampling location. This sampling package for each sampling location will be printed and distributed to the field sampling teams. The location-specific sampling package will contain the following:

- Sampling location map
- List of necessary equipment for the sampling location, including specific installation details
- Location access and property owner notification details
- Location-specific health and safety considerations
- Location-specific storm criteria, weather tracking, and tidal stage monitoring considerations
- Applicable SOPs
- Location-specific sampling method information
- Field sampling forms
- Any additional location-specific considerations

10.2.1.2 Storm Event and Mobilization Criteria

Storm-event criteria and the number of events to be sampled varies based on the point sources category. In some cases, such as the sampling of some non-weather-dependent Category 1 discharges, storm event criteria may not be applicable. The storm event criteria for weather-dependent Category 1 sampling locations and Category 3 sampling locations are as follows:

- Storms forecasted to produce more than 0.20 inch of rainfall over a minimum duration of 3 hours
- Storms preceded by at least a 48-hour dry period (defined as less than 0.10 inch of rainfall)

For the Category 2A and Category 2B sampling locations, the minimum amount of rainfall needed for a discharge to occur was estimated using the geographically neutral version of the NYCDEP point source model, as shown in Table B10-2. Based on this estimation, a storm event producing the rainfall thresholds shown in Table B10-2 would be expected to result in a CSO event 90 percent of the time and not result in a CSO event 20 percent of the time. As shown in Table B10-2, the rainfall threshold for each proposed Category 2A and Category 2B sampling location varies between 0.1 and 0.5 inch of rain.

In addition to the storm forecast, the tidal stage will be monitored. The elevation of the sampling location and the potential for tidal inundation, to the extent they are known, were assessed during reconnaissance and considered in the selection of sampling locations. Some Category 2A outfalls are equipped with tide gates that NYC has indicated remain closed in the 1- to 2-hour period before and after high tide. These tide gates could prevent a CSO event from occurring, and therefore, mobilization for Category 2A sampling could be affected if the storm event is anticipated to occur at or near high tide. Therefore, storms beginning during low tide will be targeted whenever possible, to insure that sampling can be initiated at the start of the storm and that the first-flush of the storm will be collected. Any tide gate information will be included in the location-specific sampling packages. The tidal stage will be determined and evaluated prior to mobilization. As needed, tidal conditions in which a sample could contain creek water or a tide gate could prevent a CSO from occurring (e.g., high tide) will be avoided.

Under certain high flow (wet weather) conditions and during high tide, treated effluent from the Newtown Creek WPCP may be discharged via the Category 2B high-relief outfall (NCB-002) to Whale Creek (NYSDEC 2014). The flow splitting is based on hydraulic conditions and does not require operator control. Tidal elevation and total plant inflows determine when the treated effluent flow is directed toward NCB-002. As shown in Table B10-2, the rainfall threshold for NCB-002 is 0.4 inch of rainfall.

The precipitation threshold for sampling the Newtown Creek WPCP influent during wet weather is 0.1 inch.

Weather monitoring procedures and criteria for mobilization are summarized below, with additional detail provided in SOP NC-29 – Point Sources Weather Tracking (see Attachment 1). Anchor QEA staff will monitor weather forecasts on an ongoing basis to identity potential precipitation events and schedule mobilization. Generally, the procedures will include reviewing the recent Anchor QEA weather station data to ensure that the antecedent dry-period requirement has been met and checking multiple weather forecasts to determine the likelihood and anticipated timing of an upcoming storm event. Required notifications prior to mobilization to personnel outside of Anchor QEA are described in Section 10.2.1.3.

Mobilization will ideally be timed to allow for initiation of sampling as soon as possible following observations of flow in the conveyance system. The time between the start of rainfall and the time when discharge from a point source occurs is expected to vary somewhat between the sampling locations. Mobilization timing will be refined based on observations during the sampling program and in order to achieve the objectives of the sampling program.

Storm criteria including predicted rainfall depth, antecedent dry period, and predicted storm duration will be re-evaluated after the first two storm events resulting in 0.2 inch of rainfall or 1 month after the start of the Phase 2 point sources sampling program, whichever comes first, if storms meeting the targeted criteria have not occurred or are not occurring often enough.

10.2.1.3 Pre-Sampling Notifications

Point sources method and field leads will be notified of impending storms that could potentially meet the criteria for sampling. The point sources method lead, in coordination with the point sources field lead, will determine whether the impending storm event should trigger preparation and mobilization for a sampling event. This decision will be based on a review of the weather forecasts and storm tracking described in SOP NC-29 – Point Sources Weather Tracking.

The required notifications for sampling activities outside of Anchor QEA staff will be completed prior to commencing the sampling activities. Anchor QEA will notify the NCG and USEPA at least 48 hours in advance of a potential sampling event and as soon as possible before potential mobilization in order to plan accordingly for field oversight, if desired. Anchor QEA will notify the NCG and USEPA at least 24 hours prior to mobilization and again at least 4 to 6 hours prior to mobilization. Additional notifications will be made as necessary if the forecasted storm event timing shifts. In addition to these notifications, each sampling location may have specific access and notification requirements.

10.2.2 Sampling Activities

It is anticipated that the field team for each point sources sampling location will consist of two field sampling staff. Additional sampling staff may be needed if additional pumps will be used for split sampling or bulk-water sampling, described in Sections 10.2.2.5 and 10.2.2.2, respectively. The field crews will be in contact with the point sources field lead during sampling activities. The point sources field lead will coordinate the sampling activities for each of the sampling locations. Each pair of field sampling staff will be preparing, mobilizing, and conducting the sampling activities at one of the sampling locations. The field lead will be at the field facility or will be moving between the sampling locations in the event that assistance is needed at one of the sampling locations.

Prior to sampling, the field sampling teams will be briefed at the field facility by the point sources field lead to confirm that sampling will be proceeding and to receive any special instructions regarding the sampling details, such as anticipated storm event sampling duration or modifications to sampling protocol or sampling equipment.

The following general procedures will be implemented for each point sources sampling event:

- The Phase 2 HASP (see Appendix C of the Phase 2 RI Work Plan Volumes 1 and 2) will be reviewed for potential hazards, appropriate PPE, and safety meetings to be conducted prior to field work. Site-specific health and safety documentation will also be reviewed; requirements will be detailed in the location-specific sampling package.
- All pre-cleaned sampling equipment and sample bottles will be loaded into the vehicle, including decontamination fluids/equipment and IDW containers, and fresh ice will be placed in the sample holding containers (i.e., coolers).
- Upon arriving at the sample station, safety equipment will be deployed, as needed, and a tailgate safety meeting will be conducted, including review of the Activity Hazard Analysis for point sources sampling.

- Sampling equipment will be deployed into stormwater infrastructure and the samples collected as described in additional detail in Sections 10.2.2.1 through 10.2.2.4 and SOPs NC-23 through NC-28 and SOPs NC-36 and NC-37 based on the type of sampling method employed. Water quality parameters will be measured in the field twice at each sampling location during each sampling event. Consistent with SOP NC-09 – Water Quality Monitoring and Profiling, water quality parameters measured will include temperature, pH, conductivity, DO, salinity, and turbidity. Field parameters will be recorded on the field sampling forms, consistent with the field record SOP NC-01 – Field Records (see Attachment 1 of Phase 2 FSAP Volume 1).
- Sample containers will then be transported back to the field facility, as described in additional detail in Section 10.2.3. For some sampling methods, the sample volume will need to be homogenized and/or filtered at the field facility and then split into the appropriate laboratory-provided sample containers. For other sampling methods, the sample will be collected directly into the laboratory-provided sampling containers at the sampling location or will be submitted to the laboratory in glass carboys (or equivalent), where the sample volume will be split into containers for each analysis. The sample containers to be used in the field for each sampling method are detailed in SOPs NC-23 through NC-28 and SOPs NC-36 and NC-37 (see Attachment 1). The field facility sampling homogenizing and filtering procedures are detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures (see Attachment 1).
- Once samples are prepared, the samples will be checked and information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody (see Attachment 1 of Phase 2 FSAP Volume 1). Sample containers will be placed in a secure, refrigerated (4 °C) area pending shipment to the analytical laboratory per SOP NC-07 – Sample Packaging and Shipping (see Attachment 1 of Phase 2 FSAP Volume 1). Sample handling and shipping procedures are discussed in Section 13.2.3 of Phase 2 FSAP Volume 1.
- Field activities will be documented including sample processing procedures, sample collection and COC procedures, and shipment to the laboratories. Field documentation procedures are detailed in Section 13 of Phase 2 FSAP Volume 1 and in SOP NC-01 – Field Records in Attachment 1 of Phase 2 FSAP Volume 1.

- Sampling data and field records/forms will be reviewed by the point sources field lead, scanned, entered electronically into the Field Scribe program as necessary, and sent to the Data Management Task Manager as soon as possible. Electronic data collection records will be downloaded as soon as possible and saved to the project files.
- At the end of the day and between sample intervals as necessary, all processing equipment will be decontaminated per SOP NC-02 – Equipment Decontamination (see Attachment 1 of Phase 2 FSAP Volume 1) prior to use.

10.2.2.1 Whole-Water Sampling

Sections 10.2.2.1.1 through 10.2.2.1.3 detail the sampling procedures and sampling locations for the whole-water sampling methods: manual composite sampling, manual sheetflow composite sampling, and grab sampling.

Each of the point source sampling locations in Tables B10-1 through B10-3 will be sampled up to four times to collect sufficient data to develop point source loading estimates for the Study Area. Since point sources sampling depends on multiple factors including storm frequency, storm duration, rainfall amount and intensity, the timing of tides, and logistical limitations, it may not be possible to collect four samples at all point source sampling locations within a reasonable timeframe. At some locations, the goals of the point sources sampling program may be met with fewer than four sampling events. Point sources data and the progress of the point sources sampling program will be reviewed and discussed with USEPA following each sampling event. USEPA will review the point sources sampling data and assess the progress of the point sources sampling program with respect to the established schedule and the goals of the point sources sampling program to determine whether fewer than four sampling events is acceptable for any of the point sources sampling locations.

Although the outfall IDs are used to reference the point sources discharge locations, the samples will not be collected from the outfalls. The samples may be collected from a manhole, stormwater treatment vault, or other conveyance system access point. The locations where point source samples will be collected and the sampling method to be used at each location during Phase 2 are shown on Figure B10-1. Additional information for the sampling locations is shown in Tables B10-1 through B10-3, including which sampling method will be used.

10.2.2.1.1 Manual Composite Sampling Procedures and Locations

The manual composite sampling will commence based on visual observation of flow in the conveyance pipe. One or more peristaltic pumps with 0.38-inch inner-diameter, Teflon-lined, polyethylene sampling tubing will be used to pump into one or more 6.5-gallon (24.6-liter) glass carboys (or equivalent) at regular intervals during the storm event at a rate so that the minimum-required sample volume is collected over the anticipated storm duration.

To ensure that a representative sample is collected if the storm event is shorter or longer than anticipated, three composite samples, corresponding to three different storm durations will be collected during each sampling event at each location. Based on the forecasted duration of the targeted storm, three of the following storm duration composites will be collected: 2-hour, 4-hour, 6-hour, and 8-hour. The method of determining the duration of pumping into each composite carboy during each sample collection interval, including an example pump time table, is described in SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling in Attachment 1. Following the storm event, only the composite most representative of the actual storm event duration will be processed and analyzed. The number of glass carboys is dependent on the analytical program for that sampling location, described in Section 10.2.5.

The sample intake tubing will be affixed to a pole and placed at the bottom of the pipe or regulator structure, if applicable, for sample collection. In order to collect samples representative of the entire depth of flow, up to three pieces of tubing will be affixed to the pole to pump from multiple heights. This technique may be modified during sampling. The method for determining sample collection (i.e., tubing intake) depths and the sample intake tube installation details for NYCDEP sampling locations are provided in SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling in Attachment 1. Strainers will be attached to the end of each piece of tubing to minimize the potential for clogging. If the strainer or tubing becomes clogged, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the intake assembly may be removed from the sampling manhole, cleaned of the obstruction, and replaced, and sampling will be continued. However, if clogging is a persistent problem and prevents collection of samples representative of the storm event, the sampling event may be abandoned.

Detailed procedures for whole-water manual composite sampling can be found in SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling in Attachment 1. Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

Manual composite sampling will be used at one Category 1 sampling location, eight Category 2 sampling locations, and eleven Category 3 sampling locations.

Category 1. Manual composite sampling will be used at the following Category 1 sampling location:

- Queens District 5/5a Garage (*Data Applicability Report* [DAR; Anchor QEA 2012] No. 45) – NY0200841-002

The sampling at this location will be conducted during storm events meeting the criteria outlined in Section 10.2.1.2.

Category 2. For Category 2 discharge sampling, samples will be collected during storm events meeting the criteria for Category 2 discharges.

Manual composite sampling will be used at the following seven Category 2A sampling locations:

- Long Island City interceptor system – BB-026
- Long Island City interceptor system – BB-009
- Morgan Avenue interceptor system – NCB-083
- Morgan Avenue interceptor system – NCB-015
- Morgan Avenue (via secondary interceptor) – NCQ-077

- Morgan Avenue (via secondary interceptor) – NCQ- 029
- West Street interceptor system – NCB-022

Manual composite sampling will also be used at the Category 2B Newtown Creek WPCP overflow sampling location NCB-002.

Category 3. For Category 3 stormwater discharges, samples will be collected during storm events meeting the criteria described in Section 10.2.1.2.

Manual composite sampling will be used at the following six Category 3A sampling locations:

- Near terminus of English Kills – NCB-629
- East Branch, near Grand Street Bridge, Queens side – NCQ-632
- Between Greenpoint Avenue and Apollo Street, Brooklyn side – O-185
- Newtown Creek, Queens side, near confluence with English Kills – NCQ-633
- Near Calvary Cemetery (this location may change following additional reconnaissance) – NCQ-637
- Dutch Kills – BB-610

Manual composite sampling will be used at the following eight Category 3C sampling locations:

- DAR No. 41 – Review Avenue Development I – O-193
- DAR No. 210 – Maspeth Concrete Loading Corp. – Metropolitan Avenue
- DAR No. 16 – Former Laurel Hill Site
- DAR No. 123 – Malu Properties/Former Ditmas Oil/Former Gulf Oil
- DAR No. 32 – Greenpoint Energy Center
- DAR No. 56 – Waste Management of NY/Steel Equities (Formerly POW)/DAR No. 145 – Town, County and State Recycling, Inc. (aka Review Avenue Recycling, Inc.)
- DAR No. 11a – Newtown Creek Water Pollution Control Plant – NCB-432
- DAR No. 200 – Empire Merchants/Former Paragon Oil Terminal

10.2.2.1.2 Manual Sheetflow Composite Sampling Procedures and Locations

As detailed in the Phase 2 RI Work Plan Volume 2, the Hugo Neu Schnitzer Category 3C discharge location HN-002 and overland flow discharge location at the end of Meeker Avenue discharge to the creek via sheetflow. The Category 3B highway drain for the Long Island Expressway discharges through a downspout onto a splash pad and then onto a surface that gently slopes toward Dutch Kills. A manual sheetflow composite sampling procedure will be used for these locations.

Once sheetflow is observed, a container (stainless steel or similar) will be placed at the wall along the creek where overland flow is observed at the Hugo Neu Schnitzer sampling location and under the downspout at the Long Island Expressway sampling location, allowing for flow to collect in the containers. A container is not needed at the Meeker Avenue discharge; water will be pumped directly from the pooling sheetflow on the upland side of the fence near the discharge location. At specified intervals through the sampling event, 0.38-inch inner-diameter, Teflon-lined polyethylene tubing from one or more peristaltic pumps will be placed into the approximate middle of the water depth in the container or pooled water and the water will be pumped into one or more 6.5-gallon (24.6-liter) glass carboys (or equivalent). The water will only be collected into the sampling container when runoff is occurring.

Similar to the whole-water manual composite sampling described in Section 10.2.2.1.1, three composite samples corresponding to three different storm durations will be collected during each sampling event at each location. Based on the forecasted duration of the targeted storm, three of the following storm duration composites will be collected: 2-hour, 4-hour, 6-hour, and 8-hour. The method of determining the duration of pumping into each composite carboy during each sample collection interval, including an example pump time table, is described in SOP NC-24 – Point Sources Whole-Water Sheetflow Manual Composite Sampling in Attachment 1. Following the storm event, only the composite most representative of the actual storm event duration will be processed and analyzed.

The detailed procedures for manual sheetflow composite sampling can be found in SOP NC-24 – Point Sources Whole-Water Sheetflow Manual Composite Sampling in

Attachment 1. Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

10.2.2.1.3 Grab Sampling Procedures and Locations

Where grab sampling is the selected sampling method, samples will be either pumped from a collection chamber (e.g., oil-water separator) or collected directly from a sampling port on the treatment system, which is normally the existing State Pollutant Discharge Elimination System (SPDES) point of compliance for the particular site.

The grab sampling procedures are broken into dry-weather grab sampling and grab composite sampling and are summarized below. One of the sampling locations, ExxonMobil Greenpoint Remediation Project (DAR No. 53) – NY0267724-001, will be sampled at two different locations in the stormwater and wastewater conveyance system (one collected as dry-weather grab samples and one collected as grab composite samples). The dry-weather grab samples will be collected from the groundwater treatment system compliance point and will consist of only groundwater. The grab composite samples will be collected at a location in the conveyance system where samples will consist of stormwater and groundwater.

Grab Composite Sampling. If a grab composite sample will be collected, the sampling will occur during or immediately after a significant rain event when it is anticipated that the majority of the water being treated and discharged is largely stormwater. One or more peristaltic pumps, or equivalent, with 0.38-inch inner-diameter, Teflon-lined polyethylene tubing will be used to pump the flow directly into laboratory-supplied sampling containers. Where the sample will be collected from an existing sampling port, the port will be opened and the water allowed to flow into the sample containers. In either case, water will be pumped or will be allowed to flow into the sample containers three times during the duration of the discharge (e.g., beginning, middle, and end). As described in NC SOP-25, following the decision to mobilize for sampling, the point sources method lead and point sources field lead will determine the timing of the discharge event and sampling based on the predicted timing of the storm event, the location-specific knowledge of discharge timing and how it relates to the storm event timing, and potentially, discussions with the facility personnel responsible for discharge. Samples will be collected while the outfall is actively discharging, to the extent possible. Grab composite samples provide an average of the concentrations collected at these three times while the outfall is discharging (which may represent flows from more than one storm in some cases).

The detailed procedures for grab composite sampling can be found in SOP NC-25 – Point Sources Whole-Water Grab Composite Sampling in Attachment 1. Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

Grab composite sampling will be conducted at the following four Category 1 locations:

- ExxonMobil Greenpoint Remediation Project (DAR No. 53) – NY0267724-001 (one of the two sampling locations for this discharge as described previously)
- Motiva Brooklyn Terminal (DAR No. 50) – NCB-006131-001
- BP Products N America Brooklyn Terminal (DAR No. 48) – NCB-0004596-001
- Getty Terminals Corp. #58220 (DAR No. 47) – BB-0028452-001

Dry-Weather Grab Sampling. The dry-weather grab samples will be collected at the compliance point for the individually permitted discharge. The compliance points are outfitted with sample ports. The sample port will be opened and the water allowed to flow into the laboratory-supplied sample containers until the bottles are full.

The detailed procedures for dry-weather grab sampling can be found in SOP NC-26 – Point Sources Whole-Water Dry-Weather Grab Sampling in Attachment 1. Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

Dry-weather grab sampling will be conducted at the following three locations:

- ExxonMobil Greenpoint Remediation Project (DAR No. 53) – NY0267724-001 (one of the two sampling locations for this discharge)
- ExxonMobil Greenpoint Remediation Project (DAR No. 53) – NY0267724-002
- Con Edison – 11th Street Conduit (DAR No. 110) – NCB-0201138

10.2.2.2 Bulk-Water Sampling

Bulk-water samples will be collected using a high-volume grab sampling method with the purpose of collecting combined sewer solids. This method allows for a comparison to the standard whole-water sampling, which may not collect larger particle sizes because of the sampling tube placement, size, and pumping rate. The bulk-water sampling will commence based on visual observation of overflow or water in the combined sewer infrastructure and will be collected during the duration of the CSO event so that the minimum-required sample volume is collected over the anticipated CSO discharge event duration. Bulk-water sampling involves the collection of at least 75.8 liters of water into three 6.5-gallon (24.6-liter) glass carboys (or equivalent) and four laboratory containers using a high-capacity peristaltic pump with 1.25-inch inner-diameter tubing capable of pumping solids larger than the maximum size that can be collected using the whole-water sampling methods.

The bulk-water sample volume collected into the glass carboys will be collected during three intervals during the sampling event. The sample intake tubing will be affixed to a pole and the intake will be placed 2 inches from the bottom of the pole, at the height of the lowest whole-water sampling tube for sample collection. This technique may be modified during sampling. If the tubing becomes clogged, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the intake assembly may be removed from the sampling manhole, cleaned of the obstruction, and replaced, and sampling will be continued. However, if clogging is a persistent problem and prevents collection of samples representative of the storm event, the sampling event may be abandoned. Once the desired volume has been collected, the glass carboys will be transported to the field facility.

The detailed procedures for bulk-water sampling are described in SOP NC-27 – Point Sources Bulk-Water Sampling (see Attachment 1). Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

Bulk-water sampling will be conducted at the following four Category 2A locations:

- Long Island City interceptor system – BB-026
- Morgan Avenue interceptor system – NCB-083
- Morgan Avenue interceptor system – NCB-015
- Morgan Avenue (via secondary interceptor) – NCQ-077

Bulk-water samples will be collected during one storm event sampled for each of these sampling locations during the Phase 2 RI field program. Similar to the whole-water sampling, bulk-water sampling data and the progress of the point sources sampling program will be reviewed and discussed with USEPA following each sampling event to determine if additional sampling events are necessary.

The locations where bulk-water sampling will be conducted are shown on Figure B10-1. Additional location-specific sampling details are provided in Table B10-2.

10.2.2.3 Water Pollution Control Plant Influent Sampling

Samples will also be collected from the influent to the Newtown Creek WPCP during dry and wet weather. The Newtown Creek WPCP influent will be sampled three times each during wet-weather and dry-weather conditions.

10.2.2.3.1 Dry-Weather WPCP Influent Sampling

For dry-weather sampling, during each sampling event, aliquots will be collected in the laboratory bottles periodically over a 24-hour period, resulting in the collection of a time-based composite. One or more peristaltic pumps with 0.38-inch inner-diameter polyethylene sampling tubing will be used to pump water from the WPCP influent chamber into one or more 6.5-gallon (24.6-liter) glass carboys (or equivalent) at regular intervals so that the minimum-required sample volume is collected over the 24-hour period.

The detailed procedures for WPCP influent sampling are described in SOP NC-36 – Point Sources Water Pollution Control Plant Influent Sampling (see Attachment 1). Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

10.2.2.3.2 Wet-Weather WPCP Influent Sampling

Wet-weather sampling of the WPCP influent will be collected as manual composite samples during storm events that meet or exceed the precipitation threshold presented in Section 10.2.1.2. Coordination with NYCDEP will be necessary to understand the timing of sampling in relationship to rainfall and CSO events. One or more peristaltic pumps with 0.38-inch inner-diameter, Teflon-lined, polyethylene sampling tubing will be used to pump into one or more 6.5-gallon (24.6-liter) glass carboys (or equivalent) at regular intervals during the storm event at a rate so that the minimum-required sample volume is collected over the anticipated storm duration.

To ensure that a representative sample is collected if the storm event is shorter or longer than anticipated, three composite samples, corresponding to three different storm durations, will be collected during each sampling event at each location. Based on the forecasted duration of the targeted storm, three of the following storm duration composites will be collected: 2-hour, 4-hour, 6-hour, and 8-hour. The method of determining the duration of pumping into each composite carboy during each sample collection interval, including an example pump time table, is described in SOP NC-36 – Point Sources Water Pollution Control Plant Influent Sampling in Attachment 1. Following the storm event, only the composite most representative of the actual storm event duration will be processed and analyzed. The number of glass carboys is dependent on the analytical program for that sampling location, described in Section 10.2.5.

The sample intake tubing will be affixed to a pole and placed approximately mid-depth in the influent chamber. A strainer will be attached to the end of the intake tubing to minimize the potential for clogging. If the strainer or tubing becomes clogged, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the intake assembly may be removed from the influent chamber, cleaned of the obstruction, and replaced, and sampling will be continued. However, if clogging is a persistent problem and prevents collection of samples representative of the storm event, the sampling event may be abandoned.

Detailed procedures for WPCP influent sampling (dry- and wet-weather) can be found in SOP NC-36 – Point Sources Water Pollution Control Plant Influent Sampling in

Attachment 1. Sample processing and handling procedures are detailed in Section 10.2.3. Sample analytical information is summarized in Section 10.2.5.

10.2.2.4 Discrete Total Suspended Solids Sampling

Samples will be collected for laboratory analysis of TSS every 15 minutes during the first sampling event at the locations shown in Tables B10-2 and B10-3 and on Figure B10-1. Laboratory analysis of the discrete TSS samples will be completed as quickly as feasible so that USEPA can evaluate if additional sampling events are necessary. The TSS samples will be collected directly into laboratory-supplied sampling containers. Sample processing and handling procedures are detailed in Section 10.2.3.

TSS data will be compared to the whole-water sampling results and additional sampling events may be conducted based on the TSS results from the first sampling event at each sampling location. Additional details for discrete TSS sampling procedures are included in SOP NC-28 – Point Sources Discrete Total Suspended Solids Sampling.

10.2.2.5 Split Sampling

Split samples may be collected for USEPA, NYCDEP, and/or individual site property owners at a subset of sampling locations. Procedures for split sampling are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

10.2.3 Sample Processing

Point source water samples collected in either glass carboys (or equivalent) or laboratory-supplied containers will be placed in coolers with ice and transported to the field facility. The whole-water sample volume that is collected into glass carboys will be homogenized and split into the appropriate laboratory-supplied sampling containers at the field facility, consistent with the procedures detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures (see Attachment 1). Filtering for a subset of the analyses will be conducted at the field facility. The bulk-water samples and whole-water volume collected for the particulate/dissolved analyses will be collected and submitted in glass carboys and laboratory sampling container to the laboratory for processing, filtering, and analysis, as described in Section 10.2.5.

Prior to any post-sampling processing, an evaluation will be conducted to confirm that the samples collected are as representative of the storm event sampled as possible. This includes ensuring that the storm event discharge and sampling event was at least 2 hours in duration and sampling was conducted during the majority of the storm event runoff duration up to a maximum sampling event duration of 8 hours.

Proper COC will be maintained from the time the samples are collected until they are received by the analytical laboratory, as described in SOP NC-06 – Sample Custody (see Attachment 1 of Phase 2 FSAP Volume 1). Once samples are received at the field facility, the samples will be checked and the information will be entered onto a COC record for transport to the laboratory per SOP NC-06 – Sample Custody. Sample containers will be stored at 4 °C pending shipment to the laboratory per SOP NC-07 – Sample Packaging and Shipping. Additional sample handling and shipping procedures are discussed in Section 13.2.3 of the Phase 2 FSAP Volume 1.

10.2.4 Sample Designation

Samples will be uniquely identified at the time of collection or in the field facility, if the sample is to be composited as described in Section 13.2.1 of the Phase 2 FSAP Volume 1. The nomenclature that will be used is {station identification}{matrix code}-{sequence}-{date} where:

- Station identification = a four to seven character sampling location identifier listed in Tables B10-1 through B10-3 and shown on Figure B10-1. Field duplicates will be identified by adding 1000 to the numerical portion of the station identification number.
- Rinsate and trip blanks will not require a station identifier.
- Matrix code = a character code to indicate the sample matrix. Matrix codes are as follows:
  - PSWW = point sources whole-water
  - PSBW = point sources bulk-water
  - PSTSS = point sources total suspended solids
  - RB = rinsate blank
  - TB = trip blank

- Sequence: When more than one sample is required to collect the required volume, the samples will be labeled sequentially (A, B, C, etc.).
- Date = an eight-character code to indicate the date the sample was collected in the format YYYYMMDD.

The following are examples of the sample ID procedures:

- The first point source whole-water sample collected for chemical analysis at Hugo Neu Schnitzer (DAR No. 125) on December 8, 2014, would have the following ID: HN002PSWW-A-20141208. The duplicate of this sample would have the following ID: HN1002PSWW-A-20141208.
- As noted in Table B10-1 and Section 10.2.2.1.3, two locations in the storm and wastewater conveyance system at ExxonMobil Greenpoint Remediation Project (DAR No. 53) – NY0267724-001 will be sampled. For sampling for the NY0267724-001 discharge, the Station ID will be EM001A for the treated groundwater dry-weather grab sampling location and EM001B for the stormwater/groundwater combined grab composite sampling location.
- A rinsate blank collected in association with point source discharge sampling collected on October 1, 2014, would have the following ID: PS-RB-20141001.

10.2.5 Sample Analysis

Point source discharge samples will be analyzed for one or more of the analytical programs listed in Table B10-4. The programs vary between the discharge categories and sample type. The analyte groups for each sample are listed in Tables B10-1 through B10-3.

Whole-Water Analyses. The whole-water samples will be analyzed for the constituents in the point sources general list in Table B10-4. Dissolved/particulate fractions of certain constituents (PCBs and semivolatile organic compounds, and if sufficient sample volume and particulate mass is available, pesticides and dioxins/furans) will be measured from at least one sampling location in each category to the extent feasible. Low TSS concentrations, insufficient sample volume, or a combination of both of these factors may lead to a situation where an unreasonably large or infeasible volume of water would need to be collected and filtered to achieve the particulate mass required for analysis. Therefore, it may not be possible to collect samples for dissolved and particulate analyses at all locations.

The results of the initial round of standard whole-water sampling, particularly the TSS analyses results and observations of available sample volume, will be used to identify locations where collection of samples for dissolved and particulate analyses may be feasible. Laboratory analyses of the point source samples will be completed as quickly as feasible so that USEPA can evaluate the results and determine the feasibility of collecting dissolved/particulate samples at sampling locations.

Bulk-Water Analyses. As noted in Table B10-4, the bulk-water samples will be analyzed for particulate PAHs and PCBs, percent solids, total and dissolved metals, particulate organic carbon, and grain size. If sufficient particulate sample mass is available, the samples will also be analyzed for dioxins/furans and organochlorine pesticides.

Similar to the whole-water samples, the results of the initial round of bulk-water samples will be assessed to determine if additional bulk-water samples should be collected. Additional bulk-water samples may be collected if the results of the first bulk-water sampling event for each sampling location differ significantly from the particulate results from the whole-water sampling at the same location. The sampling results will also be compared across the four bulk-water sampling locations to aid in determining if additional bulk-water samples should be collected. Laboratory analysis of bulk-water samples will be completed as quickly as feasible so that USEPA can evaluate if additional bulk-water sampling events are necessary.

The first priority for analysis of particulates from the bulk-water and whole-water samples will be PAHs and PCBs for a number of reasons. First, PCBs and PAHs were detected in most surface water samples during Phase 1, whereas the majority of pesticide and dioxin/furan results in Phase 1 surface water samples were non-detect. Second, the sample volume required for sufficient particulate sample mass for dioxins/furans and pesticides may be prohibitive. With respect to metals, the measurement of dissolved and total concentrations provides adequate information on phase distributions that is also consistent with the methods used for in-creek surface water sampling during the Phase 1 program and planned for the Phase 2 program. Therefore, prioritizing analysis of particulates for PAHs and PCBs represents a balanced approach of collecting particulate/dissolved fractions for a subset of chemicals at a subset of locations.

The list of analytes included in each analyte group are listed in the tables in Phase 2 QAPP Worksheet No. 15 (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). The required sample volume for each analysis, and the minimum volume needed for these analyses, are provided in Table B10-4.

Analyte Priority. The sample volume collected may not be sufficient to conduct analyses for the entire list of analytes in the Phase 2 point sources sampling program for some sampling locations and sampling events. Therefore, analyses to be conducted have been prioritized into groups, with Group A analytes (consisting of total dissolved solids, TSS, percent solids, PCBs, PAHs, total metals, dissolved metals, and total, dissolved, and particulate organic carbon) receiving first priority, and Groups B1 through B4 lesser priority. The volume collected will be allocated on a group-by-group basis so that sample bottles for highest priority analyses get the full required volume before filling lower priority analyses bottles. If the volume collected is insufficient for a particular group of analytes, then filling of the bottles and laboratory analyses will proceed in an adaptive manner. Based on the analyses of an initial subset of samples, subsequent samples may be diluted if adequate detection limits can still be achieved. This will result in a reduction in sample volume requirements and may permit analyses for more or all of the analytes within that group to be performed. This adaptive approach may also be applied in cases of limited solids collected for the dissolved and particulate analyte priority information also included in Table B10-4.

Laboratory Filtration Procedures for Bulk-Water and Whole-Water Particulate/Dissolved Analyses. As noted in Section 10.2.3 and Table B10-4, the whole-water sampling volume for particulate/dissolved analyses and the bulk-water sample volume for particulate analysis will be collected into glass carboys (or equivalent) and submitted to the laboratory for filtering and splitting into the appropriate sample containers. The required particulate/dissolved analyses volume will be collected into glass carboys using the whole-water manual composite sample collection method described in SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling. The required bulk-water sample volume to be analyzed for particulates will be collected into glass carboys using the bulk-water collection method described in SOP NC-27 – Point Sources Bulk-Water Sampling. The whole-water sample volume in glass carboys to be analyzed for particulate/dissolved analyses is a separate sample from the bulk-water sample volume to be analyzed for particulates with a unique sample ID, and each of the glass carboys/sets of glass carboys should be processed separately using the equipment and according to the procedures summarized as follows:

- Equipment list:
  - 6.5-gallon glass carboys (or equivalent)
  - 14.2-cm diameter, 0.7-micrometer (μm) pore glass fiber filters
  - Stainless-steel pressure filtration apparatus, or all-glass vacuum filtration apparatus
- Filter and apparatus preparation:
  - Pre-clean filtration apparatus and rinse with methylene chloride followed by de-ionized water rinse.
  - Insert a 0.7-μm pore glass fiber filter disk in the filtration apparatus. Attach a sidearm flask for glass vacuum filtration.
  - Insert a 0.7-μm glass fiber filter disk, and mount body of pressure filtration apparatus onto set screws for pressure filtration.
  - Record the manufacturer and lot number of the filter used in the logbook.
  - Apply vacuum or pressure, and wash the disk with three successive 200-milliliter (mL) portions of de-ionized water.
  - Continue suction to remove all traces of water, and discard washings.
- Sample filtration:
  - Apply vacuum to all-glass filtration apparatus.
  - Begin by pouring sample, 1 liter at a time, from the glass carboy into the filtration apparatus.
  - As filtration slows, the filter paper will need to be changed periodically. Keep all resulting filters per sample.
  - If using pressure filtration, fill stainless-steel reservoir with 1-liter volumes at a time, seal lid of pressure apparatus, apply pressure and collect sample filtrate as described in the following, retaining all resulting filter paper per sample.

  - Collect the entire volume of filtered water in a second glass carboy for dissolved sample analysis.
  - Rinse the glass carboy that contained the sample with sample filtrate and pour into the filtration apparatus.
  - Repeat rinsing procedure three times to ensure that all solids have been removed from the glass carboy.
  - Once complete, swirl the second glass carboy, which now contains the dissolved sample, in order to homogenize.
- For the whole-water particulate analysis, the solids remaining on the filter will be homogenized, weighed, and recorded, and then split into the appropriate laboratory containers for the particulate constituents. The filtrate will be split into the appropriate laboratory containers for the dissolved constituents. Any filtrate remaining after the laboratory containers are filled will be disposed of.
- For the bulk-water analysis for particulates, the solids remaining on the filter will be homogenized, weighed, and recorded, and then split into the appropriate laboratory containers for the particulate constituents. The bulk sample water that passes through the filter will be disposed of.
- The analytical laboratory information for each analysis, the particulate and dissolved analyte list, and the analyte priority are shown in Table B10-4.

Further information on the analytical program and specific analytes are provided in the Phase 2 QAPP (see Appendix A of Phase 2 RI Work Plan Volumes 1 and 2).

10.2.6 Equipment Decontamination

Point source discharge sampling equipment will be in contact with site media and, therefore, will require decontamination. Reusable sampling equipment such as glass carboys used for sample collection will be properly decontaminated between uses, as described in SOP NC-02 – Equipment Decontamination (see Attachment 1 of Phase 2 FSAP Volume 1).

10.2.7 Investigation-Derived Waste

IDW will be generated during the point sources discharge sampling activities and during equipment decontamination. Used PPE will also be generated as IDW. This IDW will be temporarily stored at the field facility and disposed of following the procedures described in Section 14 of Phase 2 FSAP Volume 1 and SOP NC-08 – Investigation-Derived Waste Handling and Disposal.

10.2.8 Standard Operating Procedures

The following SOPs are relevant to this activity:

- NC-01 – Field Records
- NC-02 – Equipment Decontamination
- NC-06 – Sample Custody
- NC-07 – Sample Packaging and Shipping
- NC-08 – Investigation-Derived Waste Handling and Disposal
- NC-09 – Water Quality Monitoring and Profiling
- NC-23 – Point Sources Whole-Water Manual Composite Sampling
- NC-24 – Point Sources Whole-Water Sheetflow Manual Composite Sampling
- NC-25 – Point Sources Whole-Water Grab Composite Sampling
- NC-26 – Point Sources Whole-Water Dry-Weather Grab Sampling
- NC-27 – Point Sources Bulk-Water Sampling
- NC-28 – Point Sources Discrete Total Suspended Solids Sampling
- NC-29 – Point Sources Weather Tracking
- NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures
- NC-36 – Point Sources Water Pollution Control Plant Influent Sampling
- NC-37 – Point Sources Split Sample Collection and Processing

10.3 Data Processing, Analysis, and Management

Data collection records from the point sources discharge sampling activities, including sample collection, processing, and sample management, will be downloaded as soon as possible and saved to the project files. Paper and electronic records will be scanned and sent to the Data Management Task Manager. Location data will be loaded into a GIS-based spatial database and added to the Study Area basemap.

Analytical data will be validated as described in the Phase 2 QAPP (see Appendix A of the Phase 2 RI Work Plan Volumes 1 and 2). Analytical data will be maintained in the project database and accessible only by designated project personnel as described in the DMP Addendum No. 1 (see Appendix D of the Phase 2 RI Work Plan Volumes 1 and 2).

10.4 Reporting

Information obtained during point sources sampling will be included in the RI report and other deliverables, as appropriate.

10.5 Schedule

Phase 2 RI field program point sources sampling activities will be conducted in multiple field mobilizations based on anticipated storm events. It is anticipated that this point sources sampling will be conducted through March 31, 2015. The schedule will be dependent on weather. As discussed in Section 10.2.2.1, the progress of the point sources sampling program will be reviewed and discussed with USEPA following each sampling event. USEPA and Anchor QEA will review the point sources sampling data and jointly assess the progress of the point sources sampling program with respect to the established schedule.

An example of point source sampling event schedules is included in Table B10-5. Logistical issues, as well as projected rainfall amounts, will limit which outfalls can be sampled during a given storm; however, a major goal of the point sources sampling program will be to achieve a balance by collecting samples from the different discharge categories across sampling events.

11 QUALITY ASSURANCE/QUALITY CONTROL

This section is provided in the Phase 2 FSAP Volume 1.

12 DOCUMENTATION AND SAMPLE MANAGEMENT

This section is provided in the Phase 2 FSAP Volume 1.

13 INVESTIGATION-DERIVED WASTE MANAGEMENT

This section is provided in the Phase 2 FSAP Volume 1.

14 REFERENCES

Anchor QEA (Anchor QEA, LLC), 2011. *Phase 1 Data Management Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. October 2011.

Anchor QEA, 2012. *Data Applicability Report*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. May 2012.

Anchor QEA, 2014a. *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014b. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. June 2014.

Anchor QEA, 2014d. *Phase 2 Quality Assurance Project Plan*. Draft. Appendix A of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. June 2014.

NYSDEC (New York State Department of Environmental Conservation), 2014. Regarding: Newtown Creek Waste Water Treatment Plant Outfalls. Memorandum from Atiqur Rahman, P.E., Region 2, Division of Water to Ian Beilby, P.E., Division of Environmental Remediation. May 14, 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water. July 1996.

TABLES

ASTM = American Society for Testing and Materials
AVS = acid volatile sulfides
BGMK = buffalo green monkey kidney
BOD = biological oxygen demand
BOD30 = biological oxygen demand (over a 30-day period)
BOD5 = biological oxygen demand (over a 5-day period)
C = Celsius
cm = centimeter
CSO = combined sewer overflow
CTD = conductivity, temperature, depth meter
DAR = Data Applicability Report
DK = Dutch Kills
DO = dissolved oxygen
DOC = dissolved organic carbon
DRO = diesel range organic
EB = East Branch
EC = electrical conductivity
EK = English Kills
EPH = extractable petroleum hydrocarbon
FLPE = fluorinated high-density polyethylene
FSAP = Field Sampling and Analysis Plan
ft = foot
GW = groundwater
HDPE = high-density polyethylene
ID = identification
L = liter
MC = Maspeth Creek
mL = milliliter
MS4 = municipal separate storm sewer system
N/A = not applicable
NAD83 = North American Datum of 1983
NC = Newtown Creek
NCG = Newtown Creek Group
No. = number
NYC = New York City
NYCDEP = New York City Department of Environmental Protection
NYCDOT = New York City Department of Transportation
NYLI = New York Long Island
ORP = oxidation-reduction potential
oz = ounce
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
POC = particulate organic carbon
PSBW = point source bulk-water
PSWW = point source whole-water
PTFE = polytetrafluoroethylene
QAPP = Quality Assurance Project Plan
SCADA = Supervisory Control and Data Acquisition
SEM = simultaneously extracted metals
SPDES = State Pollutant Discharge Elimination System
SSC = suspended sediment concentration
SVOC = semivolatile organic compound
SW = stormwater
TBD = to be determined
TDS = total dissolved solid
TKN = total Kjeldahl nitrogen
TOC = total organic carbon
TPH = total petroleum hydrocarbon
TS = total solids
TSS = total suspended solids
USEPA = U. S. Environmental Protection Agency
VOA = volatile organic analysis
VPH = volatile petroleum hydrocarbon
WC = Whale Creek
WPCP = Water Pollution Control Plant
XRD = X-ray diffraction

Table B8-1
Surface Water Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Sample Frequency	Sample Intervals	Sample ID[3]	Surface Water Testing: Field Parameters	Chemistry
Surface Water Sampling during Point Source Discharges								
DK011SW	1001045	209865	Submersible pump[4]	Five events (wet-weather); two samples per event once near peak discharge and once closer to the end of the event	Within 3 feet of water surface	DK011SW-A-DATE	Temperature, salinity, conductivity, turbidity, pH, DO	SVOCs, pesticides, PCB congeners, total metals, dissolved metals, hardness, total mercury, dissolved mercury, methyl mercury, dioxins/furans, PAHs and alkyl PAHs, TOC, DOC, POC, TSS, TDS, SSC, alkalinity, dissolved cyanide, total cyanide, ammonia, total TKN, dissolved TKN, total nitrate/nitrite, dissolved nitrate/nitrite, total phosphorus, dissolved phosphorus, BOD5, BOD30, anions (bromide, chloride, and sulfate)
					2 to 3 feet above mudline	DK011SW-C-DATE		
EB010SW	1005321	199518			Within 3 feet of water surface	EB010SW-A-DATE		
					2 to 3 feet above mudline	EB010SW-C-DATE		
EB044SW	1005620	200353			Within 3 feet of water surface	EB044SW-A-DATE		
					2 to 3 feet above mudline	EB044SW-C-DATE		
EK022SW	1003516	197557			Within 3 feet of water surface	EK022SW-A-DATE		
					2 to 3 feet above mudline	EK022SW-C-DATE		
EK088SW	1004176	200666			Within 3 feet of water surface	EK088SW-A-DATE		
					2 to 3 feet above mudline	EK088SW-C-DATE		
MC008SW	1006125	202917			Within 3 feet of water surface	MC008SW-A-DATE		
					2 to 3 feet above mudline	MC008SW-C-DATE		
NC010SW	996112	208589			Within 3 feet of water surface	NC010SW-A-DATE		
					2 to 3 feet above mudline	NC010SW-C-DATE		
NC172SW	1004187	204070			Within 3 feet of water surface	NC172SW-A-DATE		
					2 to 3 feet above mudline	NC172SW-C-DATE		
NC248SW	1001201	205472			Within 3 feet of water surface	NC248SW-A-DATE		
					2 to 3 feet above mudline	NC248SW-C-DATE		
NC252SW	1005189	201728			Within 3 feet of water surface	NC252SW-A-DATE		
					2 to 3 feet above mudline	NC252SW-C-DATE		
NC227SW	999327	207782			Within 3 feet of water surface	NC227SW-A-DATE		
					2 to 3 feet above mudline	NC227SW-C-DATE		
EB043SW	1005554	200333			Within 3 feet of water surface	EB043SW-A-DATE		TSS
					2 to 3 feet above mudline	EB043SW-C-DATE		
EK087SW	1004151	200731			Within 3 feet of water surface	EK087SW-A-DATE		
					2 to 3 feet above mudline	EK087SW-C-DATE		
NC138SW	1005093	201697			Within 3 feet of water surface	NC138SW-A-DATE		
					2 to 3 feet above mudline	NC138SW-C-DATE		
NC246SW	996043	208706			Within 3 feet of water surface	NC246SW-A-DATE		
					2 to 3 feet above mudline	NC246SW-C-DATE		
NC247SW	1001152	205425			Within 3 feet of water surface	NC247SW-A-DATE		
					2 to 3 feet above mudline	NC247SW-C-DATE		
NC249SW	1004265	204128			Within 3 feet of water surface	NC249SW-A-DATE		
					2 to 3 feet above mudline	NC249SW-C-DATE		
NC250SW	1004525	203133			Within 3 feet of water surface	NC250SW-A-DATE		
					2 to 3 feet above mudline	NC250SW-C-DATE		

Table B8-1
Surface Water Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Sample Frequency	Sample Intervals	Sample ID[3]	Surface Water Testing: Field Parameters	Surface Water Testing: Chemistry
Dry-Weather TSS Concentration Sampling								
EB043SW	1005554	200333	Peristaltic pump[4]	Two events (dry-weather)	Within 3 feet of water surface	EB043SW-A-DATE	Temperature, salinity, conductivity, turbidity, pH, DO	TSS
					2 to 3 feet above mudline	EB043SW-C-DATE		
EB044SW	1005620	200353			Within 3 feet of water surface	EB044SW-A-DATE		
					2 to 3 feet above mudline	EB044SW-C-DATE		
EK087SW	1004151	200731			Within 3 feet of water surface	EK087SW-A-DATE		
					2 to 3 feet above mudline	EK087SW-C-DATE		
EK088SW	1004176	200666			Within 3 feet of water surface	EK088SW-A-DATE		
					2 to 3 feet above mudline	EK088SW-C-DATE		
NC010SW	996112	208589			Within 3 feet of water surface	NC010SW-A-DATE		
					2 to 3 feet above mudline	NC010SW-C-DATE		
NC138SW	1005093	201697			Within 3 feet of water surface	NC138SW-A-DATE		
					2 to 3 feet above mudline	NC138SW-C-DATE		
NC172SW	1004187	204070			Within 3 feet of water surface	NC172SW-A-DATE		
					2 to 3 feet above mudline	NC172SW-C-DATE		
NC246SW	996043	208706			Within 3 feet of water surface	NC246SW-A-DATE		
					2 to 3 feet above mudline	NC246SW-C-DATE		
NC247SW	1001152	205425			Within 3 feet of water surface	NC247SW-A-DATE		
					2 to 3 feet above mudline	NC247SW-C-DATE		
NC248SW	1001201	205472			Within 3 feet of water surface	NC248SW-A-DATE		
					2 to 3 feet above mudline	NC248SW-C-DATE		
NC249SW	1004265	204128			Within 3 feet of water surface	NC249SW-A-DATE		
					2 to 3 feet above mudline	NC249SW-C-DATE		
NC250SW	1004525	203133			Within 3 feet of water surface	NC250SW-A-DATE		
					2 to 3 feet above mudline	NC250SW-C-DATE		
NC252SW	1005189	201728			Within 3 feet of water surface	NC252SW-A-DATE		
					2 to 3 feet above mudline	NC252SW-C-DATE		

Table B8-1
Surface Water Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Sample Frequency	Sample Intervals	Sample ID[3]		Surface Water Testing: Field Parameters	Surface Water Testing: Chemistry
East River Surface Water Sampling									
ER001SW	993871	207486	Peristaltic pump[4]	Monthly for 10 months (flood tide only)	Within 3 feet of water surface	ER001SW-A-DATE		Temperature, salinity, turbidity, pH, DO	SVOCs, pesticides, PCB congeners, total metals, dissolved metals, hardness, total mercury, dissolved mercury, methyl mercury, dioxins/furans, PAHs and alkyl PAHs, TOC, DOC, POC, TSS, TDS, SSC, alkalinity, dissolved cyanide, total cyanide, ammonia, total TKN, dissolved TKN, total nitrate/nitrite, dissolved nitrate/nitrite, total phosphorus, dissolved phosphorus, BOD5, BOD30, anions (bromide, chloride, and sulfate)
					Mid-depth	ER001SW-B-DATE			
					2 to 3 feet above mudline	ER001SW-C-DATE			
NC243SW	994828	208021		Monthly for 10 months: Seven events with composite sampling: three events at flood tide and at ebb tide; four events at flood tide only. Three events with discrete sampling (during flood tide only)	Within 3 feet of water surface at each station	NC243244245SW-A-DATE (samples composited)	NC243SW-A-DATE		
NC244SW	994842	207678					NC244SW-A-DATE		
NC245SW	994855	207286					NC245SW-A-DATE		
NC243SW	994828	208021			Mid-depth at each station	NC243244245SW-B-DATE (samples composited)	NC243SW-B-DATE		
NC244SW	994842	207678					NC244SW-B-DATE		
NC245SW	994855	207286					NC245SW-B-DATE		
NC243SW	994828	208021			2 to 3 feet above mudline at each station	NC243244245SW-C-DATE (samples composited)	NC243SW-C-DATE		
NC244SW	994842	207678					NC244SW-C-DATE		
NC245SW	994855	207286					NC245SW-C-DATE		

Notes:
1 = Horizontal datum is in North American Datum of 1983 (NAD83), New York Long Island (NYLI), State Plane feet.
2 = Although target coordinates are shown to the nearest foot, sampling locations are approximate and may be modified based on field conditions and access issues.
3 = Sample IDs will be finalized in the field depending on sample dates. For East River surface water sampling, “F” (flood) or “E” (ebb) will be added in front of the A/B/C depth designator.
4 = The type of pump used may vary depending on the required pumping rate and sampling logistics.

Table B8-2
Surface Water Analytical Summary

Analytical Group	Minimal Volume (mL)	Container	Preservation Requirements	Laboratory
Chemistry Parameters				
SVOCs (8270D)	2,000	2 x 1-L amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
Organochlorine pesticides (8081B)	2,000	2 x 1-L amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	
PAHs and alkyl PAHs (8270C/D-SIM)	2,000	2 x 1-L amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	
n-Alkanes and isoprenoids including DRO and TPH ranges (8015 Modified)	2,000	2 x 1-L amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	
Total phosphorus (SM4500) Ammonia-N (SM4500NH3) Total nitrate/nitrite (SM4500NO3) Total TKN (SM4500N)	500	1 x 500-mL HDPE	0 to 6 °C; 1-mL H_2SO_4 per 500-mL container to pH <2	
Dissolved phosphorus (SM4500) Dissolved nitrate/nitrite (SM4500NO3) Dissolved TKN (4500NC)	500	1 x 500-mL HDPE (field filtered)	0 to 6 °C; 1-mL H_2SO_4 per 500-mL container to pH <2	
TOC (SM5310C)	80	2 x 40-mL VOA vial	0 to 6 °C; H_2SO_4 to pH <2	
Alkalinity (SM2320B)	250	250-mL HDPE	0 to 6 °C	
Anions (bromide, chloride, sulfate; 300.0) TDS (SM 2540C)	500	500-mL HDPE	0 to 6 °C	
Total cyanide (9012B)	250	250-mL HDPE	0 to 6 °C; NaOH to pH >12	
Dissolved cyanide (9012B)	250	250-mL HDPE (field filtered)	0 to 6 °C; NaOH to pH >12	
Total metals (6010C/6020A/1632) Hardness (calculated)	500	1 x 500-mL HDPE	0 to 6 °C nitric acid to pH <2	
Dissolved metals (6010C/6020A/1632)	500	1 x 500-mL HDPE (field filtered)	0 to 6 °C; nitric acid to pH <2	
DOC (SM5310C) POC (9060 Modified/Lloyd Kahn with filtrate)	500	1 x 500-mL glass	0 to 6 °C; store in the dark	
Salinity (SM2510B)	250	1 x 250-mL HDPE	0 to 6 °C	
Sulfide (9030B)	250	1 x 250-mL HDPE	0 to 6 °C; 1-mL 1N ZnAc + NaOH to pH >9	
TSS (160.2)	1,000	1-L HDPE	0 to 6 °C	
SSC (ASTM 3977)[1]	500	One tared 500-mL HDPE	0 to 6 °C; store in the dark; weigh entire sample bottle to nearest 0.1 g and record weight upon receipt at laboratory	GeoTesting Express 1145 Massachusetts Avenue Boxborough, Massachusetts 01719
Total metals (1638 Modified)	125	1 x 125-mL HDPE	0 to 6 °C; nitric acid to pH <2	Frontier Global Sciences 11720 North Creek Parkway North, Suite 400 Bothell, Washington 98011
Dissolved metals (1638 Modified)	125	1 x 125-mL HDPE (field filtered)	0 to 6 °C; nitric acid to pH <2	
Dissolved mercury (1631)	500	1 x 250-mL FLPE (field filtered)	0 to 6 °C, BrCl in excess until yellow color is evident or test using starch iodide paper	
Total and dissolved mercury (1631)	500	2 x 250-mL FLPE	0 to 6 °C, BrCl in excess until yellow color is evident or test using starch iodide paper	
Methyl mercury (1630)	250	250-mL FLPE or glass	0 to 6°C; freshwater 4- to 5-mL 11.6-M HCl; saline 2-mL/L 9-M sulfuric acid (H_2SO_4)	
Metal speciation (LC-ICP-MS)	250	250-mL HDPE	0 to 6 °C; hydrochloric acid to pH <2	

Table B8-2
Surface Water Analytical Summary

Analytical Group	Minimal Volume (mL)	Container	Preservation Requirements	Laboratory
BOD5 (SM 5210B)	500	500-mL HDPE	0 to 6 °C	EnviroTest Laboratory 315 Fullerton Avenue Newburgh, New York 12550
BOD30 (SM5210C)	500	500-mL HDPE	0 to 6 °C	
209 PCB congeners and homolog groups (1668A)	1,000	2 x 500-mL amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	SGS North America 5500 Business Drive Wilmington, North Carolina 28405
Dioxins and furans (1613B)	1,000	1-L amber glass with PTFE-lined lid	0 to 6 °C; store in the dark	

Note:
1 = Either TSS or SSC will be analyzed at each station.

Table B8-3
Continuous Surface Water Monitoring and Current Meter Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Meter Reading Frequency	Meter Depth	Sample ID	Surface Water Testing Field Parameters
Continuous Surface Water Monitoring							
EB043SO	1005554	200333	CTD meter	Every 15 minutes, conductivity and temperature data transmitted via telemetry; periodic data download of remaining parameters to coincide with maintenance activities	1 foot below mean lower low water	EB043SO-A-DATE	Temperature, salinity, conductivity, turbidity, pH, DO, ORP
EK087SO	1004151	200731			1 foot below mean lower low water	EB087SO-A-DATE	
EB043SO	1005554	200333		Every 15 minutes, periodic data download to coincide with maintenance activities	2 to 3 feet above mudline	EB043SO-C-DATE	
EK087SO	1004151	200731			2 to 3 feet above mudline	EK087SO-C-DATE	
NC138SO	1005094	201698			1 foot below mean lower low water	NC138SO-A-DATE	
					2 to 3 feet above mudline	NC138SO-C-DATE	
NC246SO	996043	208706			1 foot below mean lower low water	NC246SO-A-DATE	
					2 to 3 feet above mudline	NC246SO-C-DATE	
NC247SO	100152	205425			1 foot below mean lower low water	NC247SO-A-DATE	
					2 to 3 feet above mudline	NC247SO-C-DATE	
NC249SO	1004265	204128			1 foot below mean lower low water	NC249SO-A-DATE	
					2 to 3 feet above mudline	NC249SO-C-DATE	
EB044SO	1005620	200353			2 to 3 feet above mudline	EB044SO-C-DATE	
EK088SO	1004176	200666			2 to 3 feet above mudline	EK088SO-C-DATE	
NC252SO	1005189	201728			2 to 3 feet above mudline	NC252SO-C-DATE	
NC010SO	996112	208589			2 to 3 feet above mudline	NC010SO-C-DATE	
NC172SO	1004187	204070			2 to 3 feet above mudline	NC172SO-C-DATE	
NC227SO	999327	207782			2 to 3 feet above mudline	NC227SO-C-DATE	
NC248SO	1001201	205472			2 to 3 feet above mudline	NC248SO-C-DATE	
NC250SO	1004525	203133			2 to 3 feet above mudline	NC250SO-C-DATE	
NC254SO	1005248	201153			2 to 3 feet above mudline	NC254SO-C-DATE	

Table B8-3
Continuous Surface Water Monitoring and Current Meter Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Meter Reading Frequency	Meter Depth	Sample ID	Surface Water Testing Field Parameters
Current Meter Deployment							
EB044AP	1005620	200353	ADCP	10-minute average recorded every 10 minutes (sampling over the averaging interval will be one measurement every 2 seconds); periodic data download to coincide with maintenance activities	3 to 4 feet above mudline	EB044AP-DATE	Current velocity, direction
EK088AP	1004176	200666				EK088AP-DATE	
NC010AP	996112	208589				NC010AP-DATE	
NC172AP	1004187	204070				NC172AP-DATE	
NC248AP	1001201	205472				NC248AP-DATE	
NC252AP	1005189	201728				NC252AP-DATE	
NC010AV	996112	208589	ADV	Every second (i.e., 1-hertz sampling frequency) periodic data download to coincide with maintenance activities	4 inches above mudline	NC010AV-DATE	Current velocity
NC172AV	1004187	204070				NC172AV-DATE	
NC227AV	999327	207782				NC227AV-DATE	
NC248AV	1001201	205472				NC248AV-DATE	
NC250AV	1004525	203133				NC250AV-DATE	
NC254AV	1005248	201153				NC254AV-DATE	

Notes:
1 = Horizontal datum is in North American Datum of 1983 (NAD83), New York Long Island (NYLI), State Plane feet.
2 = Although target coordinates are shown to the nearest foot, sampling locations are approximate and may be modified based on field conditions and access issues.

Table B9-1
Surface Sediment Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Sample Interval	Sample ID[3]	Surface Sediment Testing	Archive
Confirmation of Contaminant Distribution in Unique Areas							
EB041SG	1005302	200805	Power grab/ Ekman	0 to 15 cm	EB041SG-DEPTH-DATE	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, cyanide, ammonia, TKN, nitrate/nitrite, pH, phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density	Archive
EK078SG	1005096	200934			EK078SG-DEPTH-DATE		
EK079SG	1003777	200545			EK079SG-DEPTH-DATE		
EK080SG	1003860	200094			EK080SG-DEPTH-DATE		
EK081SG	1004030	200000			EK081SG-DEPTH-DATE		
EK082SG	1003361	199728			EK082SG-DEPTH-DATE		
EK083SG	1003061	199760			EK083SG-DEPTH-DATE		
EK084SG	1002965	199052			EK084SG-DEPTH-DATE		
EK085SG	1003138	198946			EK085SG-DEPTH-DATE		
NC229SG	1004613	203655			NC229SG-DEPTH-DATE		
NC230SG	1004693	203555			NC230SG-DEPTH-DATE		
NC233SG	1005072	202275			NC233SG-DEPTH-DATE		
NC306SG	1004346	203630			NC306SG-DEPTH-DATE		
NC307SG	1004889	203204			NC307SG-DEPTH-DATE		
NC308SG	1005010	202823			NC308SG-DEPTH-DATE		
NC309SG	1005241	201825			NC309SG-DEPTH-DATE		

Notes:

1 = Horizontal datum is in North American Datum of 1983 (NAD83), New York Long Island (NYLI), State Plane feet.

2 = Although target coordinates are shown to the nearest foot, sampling locations are approximate and may be modified based on field conditions and access issues.

3 = Sample IDs will be finalized in the field depending on sample depths.

Table B9-2
Surface Sediment Analytical Summary

Analytical Group[1]	Minimal Mass (grams)	Container	Preservation Requirements	Laboratory
Chemistry Parameters				
SVOCs (8270D)	50	1 x 8-oz wide-mouth glass	0 to 6 °C	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
PAHs and alkyl PAHs (8270D SIM)	50	1 x 8-oz wide-mouth glass	0 to 6°C/<-10 °C; store in dark	
n-alkanes and isoprenoids including DRO and TPH ranges (8015 Modified)				
Triterpanes and steranes (8270D SIM Modified)	50			
EPH (MADEP-EPH)	50	1 x 8-oz wide-mouth glass	0 to 6 °C	
VPH (MADEP-VPH)	10	2 x 40-mL septum-sealed VOA containers or 2-oz jar	Methanol	
Metals (6010C/6020A)	10	1 x 4-oz wide-mouth glass	0 to 6 °C	
TOC (9060 Modified/Lloyd Kahn)	20	1 x 8-oz wide-mouth glass	0 to 6°C/<-10 °C; store in dark	
Percent solids (SM 2540G)	10			
Soot carbon (Gustafsson et al. 1997)	10			
Ammonia-N (SM4500)	20	1 x 8-oz wide-mouth glass	0 to 6 °C	
Cyanide (9012A)	20			
Total phosphorus (SM4500P)	5			
pH (9045D)	20			
Nitrate/nitrite (SM 4500NO3)	5			
TKN (SM 4500NC)	5			
Sulfide (9030B)	20	1 x 2-oz wide-mouth glass	Fill jar completely with sediment; fill the surface with 10N NaOH/2N zinc acetate until moistened; no headspace; ship on ice 0 to 6 °C	
Mercury (1631 Modified)	10	1 x 4-oz wide-mouth HDPE	≤-15 °C	Eurofins Frontier Global Sciences 11720 North Creek Parkway North, Suite 400 Bothell, Washington 98011
Methyl mercury (1630 Modified)	10			
209 PCB congeners and homolog groups (1668A)	20	1 x 4-oz wide-mouth glass jar	0 to 6 °C/<-10 °C; store in dark	SGS Analytical Perspectives 5500 Business Drive Wilmington, North Carolina 28405
Dioxins and furans (1613B)	20			
Organochlorine pesticides (high resolution; 1699)	20			
Geotechnical Parameters				
Grain size (ASTM D442)	100	1 x 16-oz wide-mouth glass or HDPE	0 to 6 °C	GeoTesting Express 1145 Massachusetts Avenue Boxborough, Massachusetts 01719
Bulk density (ASTM D7263-09)	50			
Archive				
Archive		1 x 16-oz wide-mouth glass	< -10 °C; store in dark	None

Note:
1 = Refer to Phase 2 QAPP Worksheet No. 15 for a complete analyte list and target reporting limits.

Table B9-3
Subsurface Sediment and Native Material Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Target Penetration (feet)[2]	Sample Intervals (cm)[3]	Sample ID[3,4]	Number of Cores per Station	Subsurface Sediment and Native Material Testing	Archive
High-Resolution Sample Intervals									
DK037SC	1000730	209001	Vibracore or piston core/direct-push	≥2 feet (target recovery, may need to penetrate >5 feet)	2-cm intervals from 0 to 60 cm; 7 samples analyzed (intervals: 0-2, 2-4, 4-6, 8-10, 18-20, 28-30, and 58-60 cm)	DK037SCX-DEPTH-DATE	2	PAHs and alkylated PAHs, PCB congeners, metals, TS, soot carbon, TOC, Pb-210	Archive
EB006SC	1005327	200028				EB006SCX-DEPTH-DATE			
EK006SC	1003885	200503				EK006SCX-DEPTH-DATE			
MC005SC	1005687	203102				MC005SCX-DEPTH-DATE			
NC037SC	1000596	206910				NC037SCX-DEPTH-DATE			
NC071SC	1004849	202975				NC071SCX-DEPTH-DATE			
NC154SC	995319	208323				NC154SCX-DEPTH-DATE			
NC161SC	997745	208524				NC161SCX-DEPTH-DATE			
NC169SC	1003279	204644				NC169SCX-DEPTH-DATE			
NC174SC	1004559	203317				NC174SCX-DEPTH-DATE			
NC259SC	998632	208124				NC259SCX-DEPTH-DATE			
WC012SC	998929	207045				WC012SCX-DEPTH-DATE			
Geochronology and Chemistry Sampling									
Group A Locations									
EB045SC	1005666	200566	Vibracore	≥1 foot into native material	2-cm intervals to native contact	EB045SCX-DEPTH-DATE	2 total: 1 analyzed, 1 archived in sample intervals	Cs-137, Pb-210, TOC, TS	Archive
EK089SC	1004751	200778				EK089SCX-DEPTH-DATE			
MC007SC	1006213	202830				MC007SCX-DEPTH-DATE			
NC176SC	1005063	202836				NC176SCX-DEPTH-DATE			
NC251SC	995358	208289				NC251SCX-DEPTH-DATE			
NC261SC	1000589	207108				NC261SCX-DEPTH-DATE			
NC262SC	1001740	205215				NC262SCX-DEPTH-DATE			
NC263SC	1003577	204705				NC263SCX-DEPTH-DATE			
NC243SC	1004301	203889				NC264SCX-DEPTH-DATE			
NC265SC	1004897	201820				NC265SCX-DEPTH-DATE			
Group B Locations									
DK033SC	1000993	209994	Vibracore	≥1 foot into native material	Geochronology: 2-cm intervals to native contact Chemistry: 30-cm intervals beginning at 15 cm to 4 m below mudline	DK033SCX-DEPTH-DATE	5 total: 3 analyzed for chemistry, 1 analyzed for geochronology, 1 archived in geochronology sample intervals	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density, Cs-137, Pb-210	Archive
EB040SC	1005256	199535				EB040SCX-DEPTH-DATE			
EK076SC	1003491	197732				EK076SCX-DEPTH-DATE			
NC258SC	998254	208403				NC258SCX-DEPTH-DATE			

Table B9-3
Subsurface Sediment and Native Material Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Target Penetration (feet)[2]	Sample Intervals (cm)[3]	Sample ID[3,4]	Number of Cores per Station	Subsurface Sediment and Native Material Testing	Archive
NYC Post-Dredge Areas Sampling									
NC003SC	995132	207975	Vibracore or piston core/direct-push	≥2 feet (target recovery, may need to penetrate >5 feet)	2 sample intervals; one from the sand cover material and one from the sediment just below the sand cover	NC003SCX-DEPTH-DATE	8	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density	Archive
NC012SC	996800	208608				NC012SCX-DEPTH-DATE			
NC253SC	995734	208265				NC253SCX-DEPTH-DATE			
NC254SC	996105	208646				NC254SCX-DEPTH-DATE			
NC255SC	996486	208733				NC255SCX-DEPTH-DATE			
NC256SC	997122	208722				NC256SCX-DEPTH-DATE			
NC257SC	997232	208554				NC257SCX-DEPTH-DATE			
NC260SC	998844	207957				NC260SCX-DEPTH-DATE			
WC003SC	998942	207155				WC003SCX-DEPTH-DATE			
WC015SC	999017	207394				WC015SCX-DEPTH-DATE			
Vertical Extent of Contamination									
NC295SC	994840	208108	Direct-push, with groundwater program	≥3 feet into native material	Top of native material contact to 100 cm below contact	NC295SCX-DEPTH-DATE	1	Sediment: Visual observations Native Material: SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density	--
Refinement of Vertical Contaminant Distribution									
EK003SC	1004452	200749	Archive Cores	N/A	N/A	N/A	1	Visual observations	--
EK004SC	1003997	200701							
EK005SC	1004044	200505							
Confirmation of Contaminant Distribution in Unique Areas									
EB041SC	1005302	200805	Vibracore	20 feet or ≥1 foot into native material	15-60 cm, 60-100 cm, then 100-cm increments to native contact, roughly 100-cm intervals to bottom of core based on lithology (same as Phase 1)	EB041SCX-DEPTH-DATE	2	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density	Archive
EK078SC	1005096	200934				EK078SCX-DEPTH-DATE			
EK079SC	1003777	200545				EK079SCX-DEPTH-DATE			
EK080SC	1003860	200094				EK080SCX-DEPTH-DATE			
EK081SC	1004030	200000				EK081SCX-DEPTH-DATE			

Table B9-3
Subsurface Sediment and Native Material Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Target Penetration (feet)[2]	Sample Intervals (cm)[3]	Sample ID[3,4]	Number of Cores per Station	Subsurface Sediment and Native Material Testing	Archive
EK082SC	1003361	199728	Vibracore	20 feet or ≥1 foot into native material	15-60 cm, 60-100 cm, then 100-cm increments to native contact, roughly 100-cm intervals to bottom of core based on lithology (same as Phase 1)	EK082SCX-DEPTH-DATE	2	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density	Archive
EK083SC	1003061	199760				EK083SCX-DEPTH-DATE			
EK084SC	1002965	199052				EK084SCX-DEPTH-DATE			
EK085SC	1003138	198946				EK085SCX-DEPTH-DATE			
NC229SC	1004613	203655				NC229SCX-DEPTH-DATE			
NC230SC	1004693	203555				NC230SCX-DEPTH-DATE			
NC233SC	1005072	202275				NC233SCX-DEPTH-DATE			
NC306SC	1004346	203630				NC306SCX-DEPTH-DATE			
NC307SC	1004889	203204				NC307SCX-DEPTH-DATE			
NC308SC	1005010	202823				NC308SCX-DEPTH-DATE			
NC309SC	1005241	201825				NC309SCX-DEPTH-DATE			
Confirmation and Delineation of NAPL									
EK100SC	1004042	200678	Vibracore	20 feet or ≥1 foot into native material	N/A	N/A	1	Visual observations	--
EK101SC	1003977	200654							
EK103SC	1004060	200557							
EK104SC	1003988	200531							

Notes:
1 = Horizontal datum is North American Datum of 1983 (NAD83), New York Long Island (NYLI), State Plane feet.
2 = Although target coordinates are shown to the nearest foot, sampling locations are approximate and may be modified based on field conditions and access issues.
3 = Sample IDs will be finalized in the field depending on sample depths.
4 = More detail regarding sampling intervals is presented in the Phase 2 FSAP Volume 2 text.

Table B9-4
Subsurface Sediment Analytical Summary

Analytical Group[1]	Minimal Mass (grams)	Container	Preservation Requirements	Laboratory
Chemistry Parameters				
SVOCs (8270D)	50	1 x 8-oz wide-mouth glass	0 to 6 °C	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
PAHs and alkyl PAHs (8270D SIM)	50	1 x 8-oz wide-mouth glass	0 to 6 °C/<-10 °C; store in dark	
n-alkanes and isoprenoids including DRO and TPH ranges (8015 Modified)				
Triterpanes and steranes (8270D SIM Modified)	50			
EPH (MADEP-EPH)	50	1 x 8-oz wide-mouth glass	0 to 6 °C	
VPH (MADEP-VPH)	10	2 x 40-mL septum-sealed VOA containers or 2-oz jar	Methanol	
Metals (6010C/6020A)	10	1 x 4-oz wide-mouth glass	0 to 6 °C	
TOC (9060 Modified/Lloyd Kahn)	20	1 x 8-oz wide-mouth glass	0 to 6 °C/<-10 °C; store in dark	
Percent solids (SM 2540G)	10			
Soot carbon (Gustafsson et al. 1997)	10			
Ammonia-N (SM4500)	20	1 x 8-oz wide-mouth glass	0 to 6 °C	
Cyanide (9012A)	20			
Total phosphorus (SM4500P)	5			
pH (9045D)	20			
Nitrate/nitrite (SM 4500NO3)	5			
TKN (SM 4500NC)	5			
Sulfide (9030B)	20	1 x 2-oz wide-mouth glass	Fill jar completely with sediment; fill the surface with 10N NaOH/2N zinc acetate until moistened; no headspace; ship on ice 0 to 6 °C	
Mercury (1631 Modified)	10	1 x 4-oz wide-mouth HDPE	≤-15 °C	Eurofins Frontier Global Sciences 11720 North Creek Parkway North, Suite 400 Bothell, Washington 98011
Methyl mercury (1630 Modified)	10			
209 PCB congeners and homolog groups (1668A)	20	1 x 4-oz wide-mouth glass jar	0 to 6 °C/<-10 °C; store in dark	SGS Analytical Perspectives 5500 Business Drive Wilmington, North Carolina 28405
Dioxins and furans (1613B)	20			
Organochlorine pesticides (high resolution; 1699)	20			
Geotechnical Parameters				
Grain size (ASTM D442)	100	1 x 16-oz wide-mouth glass or HDPE	0 to 6 °C	GeoTesting Express 1145 Massachusetts Avenue Boxborough, Massachusetts 01719
Bulk density (ASTM D7263-09)	50			
Geochronology Parameters				
Radionuclides (^{137}Cs, ^{210}Pb)	100	1 x 4-oz wide-mouth glass or plastic	Ambient	ATI Environmental Inc. – Midwest Lab 700 Landwehr Road Northbrook, Illinois 60062
Archive				
Archive		1 x 16-oz wide-mouth glass	< -10 °C; store in dark	None

Note:
1 = Refer to Phase 2 QAPP Worksheet No. 15 for a complete analyte list and target reporting limits.

Table B9-5
In-Creek Sediment Trap Sampling Summary

Station ID	Target Coordinates[1,2] (NAD83 NYLI) Easting (X)	Northing (Y)	Sampling Method	Sample ID	Sample Frequency	Number of Traps Per Station	Sediment Trap Testing
DK006ST	1000182	208586	Sediment trap	DK006ST-DATE	Quarterly for 9 months, physical traps checked monthly	4 total: 1 for physical and 3 for chemical testing	SVOCs, PAHs and alkylated PAHs, EPH/VPH, n-alkanes and isoprenoids, triterpanes and steranes, metals, mercury, total cyanide, ammonia, TKN, nitrate/nitrite, pH, total phosphorous, sulfide, soot carbon, TOC, TS, PCB congeners, dioxin/furans, pesticides, methyl mercury, grain size, density
DK011ST	1000966	209974		DK011ST-DATE			
DK014ST	999332	208063		DK014ST-DATE			
EB005ST	1006160	200129		EB005ST-DATE			
EB042ST	1005276	199603		EB042ST-DATE			
EK004ST	1003987	200704		EK004ST-DATE			
EK010ST	1003161	199758		EK010ST-DATE			
EK065ST	1003009	199030		EK065ST-DATE			
EK086ST	1003467	197684		EK086ST-DATE			
MC025ST	1005228	203135		MC025ST-DATE			
MC026ST	1005223	202933		MC026ST-DATE			
MC027ST	1006088	202928		MC027ST-DATE			
NC015ST	997128	208548		NC015ST-DATE			
NC044ST	1001011	205973		NC044ST-DATE			
NC057ST	1002950	204602		NC057ST-DATE			
NC065ST	1004348	204003		NC065ST-DATE			
NC075ST	1004815	201941		NC075ST-DATE			
NC078ST	1005119	201065		NC078ST-DATE			
NC111ST	999416	207637		NC111ST-DATE			
NC119ST	1002980	204792		NC119ST-DATE			
NC124ST	1004171	203884		NC124ST-DATE			
NC218ST	1005109	202237		NC218ST-DATE			
NC236ST	995214	208218		NC236ST-DATE			
NC237ST	995410	207888		NC237ST-DATE			
NC238ST	997145	208779		NC238ST-DATE			
NC239ST	999492	207809		NC239ST-DATE			
NC240ST	1000851	205937		NC240ST-DATE			
NC241ST	1004472	202947		NC241ST-DATE			
NC242ST	1005388	201063		NC242ST-DATE			
WC016ST	998965	207055		WC016ST-DATE			

Notes:

1 = Horizontal datum is in North American Datum of 1983, New York Long Island , State Plane feet.

2 = Although target coordinates are shown to the nearest foot, sampling locations are approximate and may be modified based on field conditions and access issues.

Table B9-6
In-Creek Sediment Analytical Summary

Analytical Group[1]	Minimal Mass (grams)	Container	Analyte Priority Group	Preservation Requirements	Laboratory
Chemistry Parameters					
SVOCs (8270D)	50	1 x 8-oz wide-mouth glass	B	0 to 6 °C	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
PAHs and alkyl PAHs (8270D SIM)	50	1 x 8-oz wide-mouth glass	A	0 to 6 °C/<-10 °C; store in dark	
n-alkanes and isoprenoids including DRO and TPH ranges (8015 Modified)			B		
Triterpanes and steranes (8270D SIM Modified)	50		B		
EPH (MADEP-EPH)	50	1 x 8-oz wide-mouth glass	B	0 to 6 °C	
VPH (MADEP-VPH)	10	2 x 40-mL septum-sealed VOA containers or 2-oz jar	B	Methanol	
Metals (6010C/6020A)	10	1 x 4-oz wide-mouth glass	A	0 to 6 °C	
TOC (9060 Modified/Lloyd Kahn)	20	1 x 8-oz wide-mouth glass	A	0 to 6 °C/<-10 °C; store in dark	
Percent solids (SM 2540G)	10		B		
Soot carbon (Gustafsson et al. 1997)	10		B		
Ammonia-N (SM4500)	20	1 x 8-oz wide-mouth glass	B	0 to 6 °C	
Cyanide (9012A)	20		B		
Total phosphorus (SM4500P)	5		B		
pH (9045D)	20		B		
Nitrate/nitrite (SM 4500NO3)	5		B		
TKN (SM 4500NC)	5		B		
Sulfide (9030B)	20	1 x 2-oz wide-mouth glass	B	Fill jar completely with sediment; fill the surface with 10N NaOH/2N zinc acetate until moistened; no headspace; ship on ice 0 to 6 °C	
Mercury (1631 Modified)	10	1 x 4-oz wide-mouth HDPE	A	≤-15 °C	Eurofins Frontier Global Sciences 11720 North Creek Parkway North, Suite 400 Bothell, Washington 98011
Methyl mercury (1630 Modified)	10		B		
209 PCB congeners and homolog groups (1668A)	20	1 x 4-oz wide-mouth glass jar	A	0 to 6 °C/<-10 °C; store in dark	SGS Analytical Perspectives 5500 Business Drive Wilmington, North Carolina 28405
Dioxins and furans (1613B)	20		B		
Organochlorine pesticides (high resolution; 1699)	20		B		
Geotechnical Parameters					
Grain size (ASTM D442)	100	1 x 16-oz wide-mouth glass or HDPE	B	0 to 6 °C	GeoTesting Express 1145 Massachusetts Avenue Boxborough, Massachusetts 01719
Bulk density (ASTM D7263-09)	50		B		
Archive					
Archive		1 x 16-oz wide-mouth glass		<-10 °C; store in dark	None

Note:
1 = Refer to Phase 2 QAPP Worksheet No. 15 for a complete analyte list and target reporting limits.

Table B10-1
Point Source Discharges Sampling Summary – Category 1

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Treatment Before Discharge	Sample Collection Location	Conditions Under which Discharges Occur	Sampling Method (SOP Number)[1]	Maximum Number of Sampling Events[4]	Analyses List [2,5]	Sample Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][3]
Category 1 – Individually Permitted Stormwater and Wastewater Discharges	ExxonMobil Greenpoint Remediation Project (DAR No. 53)	NY0267724-001	EM001A	On-site groundwater treatment system effluent	Groundwater remediation system (aeration tanks, sand filters, pumps, catalytic oxidation units, air stripper, and iron/calcium control)	Port on treatment system	Groundwater discharge – constant rate 92 percent of the year	Dry-weather grab sampling (NC-26)	4	Point source water – general	24.6	EM001APSWW-SEQUENCE-DATE
			EM001B	On-site stormwater and groundwater treatment system effluent	Oil-water separator for stormwater	Oil-water separator effluent	Stormwater and groundwater discharge – during rain events	Grab composite sampling (NC-25)				EM001BPSWW-SEQUENCE-DATE
	ExxonMobil Greenpoint Remediation Project (DAR No. 53)	NY0267724-002	EM002	Groundwater treatment system effluent	Groundwater remediation system (aeration tanks, sand filters, pumps, catalytic oxidation units, air stripper, and iron/calcium control)	Port on treatment system	Groundwater discharge – constant rate 92 percent of the year	Dry-weather grab sampling (NC-26)	4	Point source water – general	24.6	EM002PSWW-SEQUENCE-DATE
	Motiva Brooklyn Terminal (DAR No. 50)	NY0006131-001	MBT001	Stormwater, hydrostatic test water	Large volume oil-water separator	Through grate on oil-water separator	Stormwater discharges when east oil-water separator is full via manual operation	Grab composite sampling (NC-25)	4	Point source water – general	24.6	MBT001PSWW-SEQUENCE-DATE
	BP Products N America Brooklyn Terminal (DAR No. 48)	NCB-0004596-001	BPBT001	Stormwater, secondary containment, hydrostatic test water	Oil-water separators and two 30,000-gallon carbon treatment units	Port on treatment system	Stormwater and secondary containment water discharge from oil-water separators and carbon treatment units	Grab composite sampling (NC-25)	4	Point source water – general	24.6	BPBT001PSWW-SEQUENCE-DATE
	Queens District 5/5a Garage (DAR No. 45)	NY0200841-002	QDG002	Stormwater	Absorbent socks in catch basins, oil-water separator	Compliance point manhole	Stormwater discharges during rain events	Manual composite sampling (NC-23)	4	Point source water – general	24.6	QDG002PSWW-SEQUENCE-DATE
	Con Edison - 11th Street Conduit (DAR No. 110)	NCB-0201138	CE11SC	Groundwater and stormwater (very little) infiltration into utility conduit	Oil-water separator	Compliance point	Groundwater infiltration into utility conduit (and very little stormwater) is pumped to creek when level switch is triggered	Dry-weather grab sampling (NC-26)	4	Point source water – general	24.6	CE11SCPSWW-SEQUENCE-DATE
	Getty Terminals Corp. #58220 (DAR No. 47)	BB-0028452-001	GTC001	Stormwater and secondary containment water	Oil-water separators and carbon-bag filter unit (unknown size)	Port in effluent pipe following treatment	Stormwater is pumped (operated manually) from treatment system when oil-water separator is full and/or during storm events	Grab composite sampling (NC-25)	4	Point source water – general	24.6	GTC001PSWW-SEQUENCE-DATE

Notes:
1 = This sampling method may be revised following field reconnaissance.
2 = Refers to the analyses list in Table B10-4.
3 = Sample ID: [{station ID}{matrix code}-{sequence}-{date}]. Matrix code is either PSWW (point sources whole-water), PSBW (point sources bulk-water) or PSTSS (point sources total suspended solids). Date format: YYYYMMDD. Sequence: A for the first sample, B for the second sample, and so on.
4 = Each point source location will be sampled up to four times. USEPA will review the point sources sampling data and progress with respect to the point sources schedule and goals and will determine whether fewer than four sampling events is acceptable.
5 = The results of the first round of sampling will be used to determine which sampling locations have discharge conducive to dissolved/particulate analysis.

Table B10-2
Point Source Discharges Sampling Summary – Category 2

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Site-Specific Sampling Details	Conditions Under which Discharges Occur [1]	Sampling Method (SOP Number)[2]	Maximum Number of Sampling Events[5,7]	Analyses List[3, 6]	Sample Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][4]
Category 2A – Combined Sewer Discharges	Long Island City Interceptor System	BB-026	BB026	CSO	– Flow meter has been installed at this location as part of NYC flow metering pilot study. – Samples will be collected at regulator structure manhole once flow is observed through the tide gate. – Manhole located in parking lane; will need to park sampling vehicle at manhole ahead of the sampling event to ensure access. Can set up equipment on sidewalk to limit impact on traffic. – Access for sampling will be coordinated with NYC.	0.4-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	BB026PSWW-SEQUENCE-DATE
							Bulk-water sampling (NC-27)	1	Bulk-water list	98.4	BB026PSBW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	BB026PSTSS-SEQUENCE - DATE
	Long Island City Interceptor System	BB-009	BB009	CSO	– Samples will be collected at regulator structure manhole once flow is observed. – Flow observation cannot be done at the tide gate due to missing safety cross bar. An alternative method to confirm flow will be required. – Manhole located in roadway. Traffic control will be required to conduct sampling activities. – Access for sampling will be coordinated with NYC.	0.5-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	BB009PSWW-SEQUENCE-DATE
	Morgan Avenue Interceptor System	NCB-083	NCB083	CSO	– Regulator structure is not accessible because it's located underground without manhole access. Manhole downstream of regulator determined to be periodically tidally inundated. The manhole upstream of the regulator on St. Nicholas Avenue is the likely sampling location, pending reconnaissance. – Traffic control will be necessary to sample at this location because the manhole is located in the middle of an intersection. – Manual sampling will be necessary at this location because there is no location to leave sampling equipment in place. – Access for sampling will be coordinated with NYC.	0.1-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCB083PSWW-SEQUENCE-DATE
							Bulk-water sampling (NC-27)	1	Bulk-water list	98.4	NCB083PSBW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCB083PSTSS-SEQUENCE - DATE

Table B10-2
Point Source Discharges Sampling Summary – Category 2

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Site-Specific Sampling Details	Conditions Under which Discharges Occur [1]	Sampling Method (SOP Number)[2]	Maximum Number of Sampling Events[5,7]	Analyses List[3, 6]	Sample Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][4]
Category 2A – Combined Sewer Discharges	Morgan Avenue Interceptor System	NCB-015	NCB015	CSO	– Samples will be collected from regulator structure manhole directly upstream of tide gates once it is apparent that tide gates are open and discharge is occurring. – Sampling location is inside a gated area that is used for NYC bus parking. There is minimal traffic and sufficient space, but bus traffic may be an issue depending on timing. – Access for sampling and to the gated parking lot will be coordinated with NYC.	0.4-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCB015PSWW-SEQUENCE-DATE
							Bulk-water sampling (NC-27)	1	Bulk-water list	98.4	NCB015PSBW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCB015PSTSS-SEQUENCE-DATE
	Morgan Avenue (via secondary interceptor)	NCQ-077	NCQ077	CSO	– Samples will be collected at regulator structure manhole directly upstream of tide gate once it has been verified that the tide gate is open and the discharge to the creek is occurring. – Manhole located in parking lane; will need to park sampling vehicle at manhole ahead of the sampling event to ensure access. – Access for sampling will be coordinated with NYC.	0.3-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCQ077PSWW-SEQUENCE-DATE
							Bulk-water sampling (NC-27)	1	Bulk-water list	98.4	NCQ077PSBW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCQ077PSTSS-SEQUENCE-DATE
	Morgan Avenue (via secondary interceptor)	NCQ-029	NCQ029	CSO	– NYC maintenance staff indicated that this location does not overflow very often, if at all. NYC is verifying model estimates of discharges at this location. – Due to heavy traffic at the regulator manhole and tidal inundation downstream, sampling will be conducted at a manhole upstream of the regulator. – Reconnaissance is needed before sampling location can be finalized. Traffic control will likely be needed at sampling location. – Access for sampling will be coordinated with NYC.	0.3-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCQ029PSWW-SEQUENCE-DATE

Table B10-2
Point Source Discharges Sampling Summary – Category 2

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Site-Specific Sampling Details	Conditions Under which Discharges Occur [1]	Sampling Method (SOP Number)[2]	Maximum Number of Sampling Events[5,7]	Analyses List[3, 6]	Sample Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][4]
Category 2A – Combined Sewer Discharges	West Street Interceptor System	NCB-022	NCB022	CSO	– Samples will be collected from the regulator manhole when the tide gate is open. – Sampling location is inside a gated NYCDOT storage facility, with minimal traffic. – Access for sampling will be coordinated with NYC. The NYCDOT facility is gated and NYC will need to ensure that NYCDOT trucks are not parked on sampling manhole.	0.4-inch rainfall for CSO discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCB022PSWW-SEQUENCE-DATE
Category 2B – WPCP Treated Effluent	Newtown Creek WPCP High Flow Relief Discharge	NCB-002	NCB002	Treated effluent	– Samples will be collected at the location where water overtops the weir at the WPCP and begins to discharge to Whale Creek. – Samples will be collected using a pole with peristaltic pump tubing attached. Intake of tubing will be placed at the weir to collect water as it overtops the weir on the way to NCB-002. – Access for sampling will be coordinated with NYC.	0.4-inch rainfall for discharge	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCB002PSWW-SEQUENCE-DATE
WPCP Influent Sampling	Newtown Creek WPCP	Not applicable	NCWPCPDW	Dry-weather flow prior to treatment at WPCP	– Samples will be collected from the influent chamber of the WPCP during dry-weather conditions over a 24-hour period. Samples will be collected using pump tubing lowered from the upper level above the influent chamber. An in-line pump may be needed due to the lift limitations of a peristaltic pump. – Access for sampling will be coordinated with NYC.	Not applicable	Dry-weather WPCP influent sampling (NC-36)	3	Point source water – general	24.6	NCWPCPDWPSWW-SEQUENCE-DATE
			NCWPCPWW	Wet-weather combined sewer flow prior to treatment at WPCP	– Samples will be collected from the influent chamber of the WPCP during wet-weather conditions. System behavior will be discussed with NYCDEP to determine response time of system to rainfall starting and stopping in the collection system watershed. Samples will be collected using pump tubing lowered from the upper level above the influent chamber. An in-line pump may be needed due to the lift limitations of a peristaltic pump. – Access for sampling will be coordinated with NYC.	0.1-inch rainfall (corresponding to CSO discharge threshold at NCB-083)	Wet-weather WPCP influent sampling (NC-36)	3	Point source water – general	24.6	NCWPCPWWPSWW-SEQUENCE-DATE

Notes:

1 = The minimum amount of rainfall needed for a CSO event to occur was estimated using the geographically neutral version of the NYCDEP point source model. This rainfall amount would be anticipated to produce a CSO event 90 percent of the time and would be anticipated to not produce a CSO event 10 percent of the time (20 percent of the time for outfall BB-013).

2 = This sampling method may be revised following field reconnaissance.

3 = Refers to the analyses list in Table B10-4.

4 = Sample ID: [{station ID}{matrix code}-{sequence}-{date}]. Matrix code is either PSWW (point sources whole-water), PSBW (point sources bulk-water) or PSTSS (point sources total suspended solids). Date format: YYYYMMDD. Sequence: A for the first sample, B for the second sample, and so on.

5 = Laboratory analyses for the first sample collected from this location will be completed as quickly as feasible so that USEPA and the NCG can evaluate if additional whole-water sampling events are necessary.

6 = Each point source location will be sampled up to four times. USEPA will review the point sources sampling data and progress with respect to the point sources schedule and goals and will determine whether fewer than four sampling events is acceptable.

7 = Additional bulk-water samples may be collected if the results of the first bulk-water sampling event for each sampling location differ significantly from the particulate results from the whole-water sampling at the same location. The sampling results will also be compared across bulk-water sampling locations to aid in determining if additional bulk-water samples should be collected.

Table B10-3
Point Source Discharges Sampling Summary – Category 3

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Conditions Under which Discharges Occur	Site-Specific Sampling Details	Sampling Method (SOP Number)[1]	Maximum Number of Sampling Events[6]	Analyses List [2, 7]	Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][3]
Category 3A – Major Stormwater Discharges and Municipal Separate Storm Sewer System (MS4) Discharges	Near terminus of English Kills	NCB-629	NCB629	Stormwater	During storm events resulting in at least 0.2 inch of rainfall	– Sampling manhole identified at dead-end on Gardner Street. – Manhole is in the middle of the street, but at a dead-end, so traffic control is not needed. – Access for sampling will be coordinated with NYC.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCB629PSWW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCB629PSTSS-SEQUENCE-DATE
	East Branch, near Grand Street Bridge, Queens side	NCQ-632	NCQ632			– Sampling manhole identified on private property on Page Place just upstream of junction of Page Place conveyance pipe with Grand Avenue conveyance pipe. – Manhole is in a parking lot, so traffic control is not needed, but coordination with property owner is needed. – Access for sampling will be coordinated with NYC.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCQ632PSWW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCQ632PSTSS-SEQUENCE-DATE
	Between Greenpoint Avenue and Apollo Street, Brooklyn side	O-185	O185			– Sampling manhole identified on private property used as petroleum truck fleet parking and repair facility. – Will need to coordinate access with property owner because sampling will impact truck traffic at the facility.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	O185PSWW-SEQUENCE-DATE

Table B10-3
Point Source Discharges Sampling Summary – Category 3

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Conditions Under which Discharges Occur	Site-Specific Sampling Details	Sampling Method (SOP Number)[1]	Maximum Number of Sampling Events[6]	Analyses List [2, 7]	Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][3]
Category 3A – Major Stormwater Discharges and Municipal Separate Storm Sewer System (MS4) Discharges	Newtown Creek, Queens side, near confluence with English Kills	NCQ-633	NCQ633	Stormwater	During storm events resulting in at least 0.2 inch of rainfall	– Sampling manhole identified on private property. – Manhole is in a parking lot, so traffic control is not needed, but will need to coordinate with property owner.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCQ633PSWW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCQ633PSTSS-SEQUENCE-DATE
	Near Cavalry Cemetery	NCQ-637	NCQ637			– Sampling manhole identified on shoulder of Laurel Hill Boulevard may be tidally inundated. Additional reconnaissance is needed. – Access for sampling will be coordinated with NYC.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NCQ637PSWW-SEQUENCE-DATE
							Discrete TSS sampling (NC-28)	1	TSS	Depends on storm duration (one discrete 1-L sample every 15 minutes)	NCQ633PSTSS-SEQUENCE-DATE
	Terminus of Dutch Kills	BB-610[5]	BB610			– Site reconnaissance has not been completed and is needed to locate a manhole that provides access to stormwater flow while avoiding tidal influence.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	BB610PSWW-SEQUENCE-DATE
	Meeker Avenue – Overland Flow	N/A[4]	MA001			– Sampling location identified in the right-of-way at the end of Meeker Avenue immediately before overland flow discharges to the creek. – Overland flow from Meeker Avenue pools on upland side of fence; sample will be pumped from the pooled water.	Sheetflow manual composite sampling (NC-24)	4	Point source water – general	24.6	MA001PSWW-SEQUENCE-DATE
Category 3B – Highway Drains	Runoff from Long Island Expressway	N/A	LIE001	Stormwater	During storm events resulting in at least 0.2 inch of rainfall	– Sampling location identified below bridge downspout that conveys flow from catch basins on the bridge deck on the west side of Dutch Kills. – Sampling location is on private property used for storage of construction equipment by Eurocraft Contracting; site activity is minimal and access is available 24 hours a day, 7 days a week. – Sample will be collected by pumping with a peristaltic pump from a shallow sump placed under downspout.	Sheetflow manual composite sampling (NC-24)	4	Point source water – general	24.6	LIE001PSWW-SEQUENCE-DATE

Table B10-3
Point Source Discharges Sampling Summary – Category 3

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Conditions Under which Discharges Occur	Site-Specific Sampling Details	Sampling Method (SOP Number)[1]	Maximum Number of Sampling Events[6]	Analyses List [2, 7]	Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][3]
Category 3C – Direct Discharges from Individual Sites	Hugo Neu Schnitzer (aka SIMS Hugo Neu) (DAR No. 125)	HN-002	HN002	Stormwater	During storm events resulting in at least 0.2 inch of rainfall	– Samples will be collected from the overland flow at the site's SPDES compliance point on the bank of Dutch Kills, shown as HN-002. – Samples will be pumped via peristaltic pump from a shallow sump placed along the concrete block wall at the point of the overland flow discharge. – Access for sampling will be coordinated through Hugo Neu Schnitzer.	Sheetflow manual composite sampling (NC-24)	4	Point source water – general	24.6	HN002PSWW-SEQUENCE-DATE
	Review Avenue Development I (DAR No. 41)	O-193	RAD001			– Sample will be collected from the top port of oil-water separator (also compliance point) through which site runoff from the northern half of the property flows. – Yard traffic may pose access limitations; access for sampling will need to be coordinated with the property owner, Green Asphalt.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	RAD001PSWW-SEQUENCE-DATE
	Former Laurel Hill Site (DAR No. 16)	O-135	FLH001			– Sample will be collected from manhole (manhole ID FLH001). During reconnaissance, it was determined that locations further downstream were tidally inundated. – Access for sampling will be coordinated with the property owner, Jetro/Restaurant Depot.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	FLH001PSWW-SEQUENCE-DATE
	Malu Properties/Former Ditmas Oil/Former Gulf Oil (DAR No. 123)	NCB-0005789-001	MP001			– Sample will be collected through a port in the top of the oil-water separator as the water is flowing into the effluent pipe. – Access for sampling will be coordinated with Malu Properties; sampling personnel must be escorted while on site.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	MP001PSWW-SEQUENCE-DATE

Table B10-3
Point Source Discharges Sampling Summary – Category 3

Discharge Category	Location/DAR Site Name	Outfall ID	Station ID	Type of Discharge	Conditions Under which Discharges Occur	Site-Specific Sampling Details	Sampling Method (SOP Number)[1]	Maximum Number of Sampling Events[6]	Analyses List [2, 7]	Volume Required (L)	Sample ID [{station ID}{matrix code}-{sequence}-{date}][3]
Category 3C – Direct Discharges from Individual Sites	Greenpoint Energy Center (DAR No. 32)	NG-001	NG001	Stormwater	During storm events resulting in at least 0.2 inch of rainfall	– Sample will be collected from manhole in facility stormwater conveyance system. – Manhole is located in a parking spot and there is traffic in vicinity of manhole. – Access for sampling will be coordinated with the property owner, National Grid; site escort is required during sampling.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	NG001PSWW-SEQUENCE-DATE
	Waste Management of NY/Steel Equities (formerly POW; DAR No. 54)/ Town, County and State Recycling, Inc. (aka Review Avenue Recycling, Inc.; DAR No. 145)	O-202	WM001			– Sample will be collected from a catch basin upstream of Outfall O-202. – Yard traffic may pose sampling vehicle location limitations; access for sampling will be coordinated with Waste Management personnel.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	WM001PSWW-SEQUENCE-DATE
	Newtown Creek Water Pollution Control Plant (DAR No. 11a)	NCB-432	NCP001			– There are two catch basins associated with this outfall; the sample will be collected from the catch basin closest to outfall. – Sample location is within the Newtown Creek WPCP; access will be coordinated through NYC.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	GMT001PSWW-SEQUENCE-DATE
	Empire Merchants/Former Paragon Oil Terminal (DAR No. 200)	O-55	EMP001			– Sample will be collected from a trench drain that conveys sheetflow from rainfall landing in a portion of the parking lot. – Access for sampling will be coordinated with the property owner, Empire Merchants.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	EMP001PSWW-SEQUENCE-DATE
	Maspeth Concrete Loading Corp. – Metropolitan Avenue (DAR No. 210)	NCQ-442	MCL001			– Sample will be collected from a catch basin in the stormwater conveyance system. – Stormwater at the property is collected into a single drain line or discharges via overland flow. – Heavy truck traffic at site; will coordinate with the property owner, Quadrozzi Realty, for access.	Manual composite sampling (NC-23)	4	Point source water – general	24.6	MCL001PSWW-SEQUENCE-DATE

Table B10-3
Point Source Discharges Sampling Summary – Category 3

Notes:
1 = This sampling method may be revised following field reconnaissance.
2 = Refers to the analyses list in Table B10-4.
3 = Sample ID: [{station ID}{matrix code}-{sequence}-{date}]. Matrix code is either PSWW (point sources whole-water), PSBW (point sources bulk-water) or PSTSS (point sources total suspended solids). Date format: YYYYMMDD. Sequence: A for the first sample, B for the second sample, and so on.
4 = Not applicable; location discharges as overland flow.
5 = Proposed as a potential sampling location pending the results of reconnaissance.
6 = Each point source location will be sampled up to four times. USEPA will review the point sources sampling data and progress with respect to the point sources schedule and goals and will determine whether fewer than four sampling events is acceptable.
7 = The results of the first round of sampling will be used to determine which sampling locations have discharge conducive to dissolved/particulate analysis.

Table B10-4
Point Sources Analytical Summary

Analytical Group[1]	Minimum Volume[6] (mL)	Container	Analyte Priority Group[2]	Preservation Requirements	Laboratory
Point Sources Water – General List					
Alkalinity (SM 2320B)	250	1 x 250-mL HDPE	B4	0 to 6 °C	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
Anions (SO_4, Cl, Br; 300.0)	250	1 x 250-mL HDPE	B4	0 to 6 °C	
TDS (SM2540C)	250	1 x 250-mL HDPE	A	0 to 6 °C	
TOC (SM5310C)	80	2 x 40-mL VOA vial	A	0 to 6 °C; H2SO4 to pH <2	
TSS (2540D)	1,000	1 x 1-L HDPE	A	0 to 6 °C	
PAHs and alkyl PAHs (8270DSIM)[3]	2,000	2 x 1-L amber glass with Teflon-lined lid	A	0 to 6 °C; store in the dark	
SVOCs (8270D)	2,000	2 x 1-L amber glass with Teflon-lined lid	B1	0 to 6 °C; store in the dark	
n-alkanes and isoprenoids including DRO and TPH ranges (8015 Modified)	2,000	2 x 1-L amber glass with Teflon-lined lid	B2	0 to 6 °C; store in the dark	
Organochlorine pesticides (8081B)	2,000	2 x 1-L amber glass with Teflon-lined lid	B1	0 to 6 °C; store in the dark	
Total metals (6010C/6020A/1632)	500	1 x 500-mL HDPE	A	0 to 6 °C; nitric acid to pH <2	
Dissolved metals (6010C/6020A/1632)	500	1 x 500-mL HDPE	A	0 to 6 °C; nitric acid to pH <2	
Hardness (calculated)	N/A	N/A	N/A	N/A	
Total cyanide (9012A)	250	1 x 250-mL HDPE	B3	0 to 6 °C; NaOH to pH >12	
Total phosphorus (SM4500P) Ammonia-N (SM4500NH3) Total nitrate/nitrite (SM4500NO3) Total TKN (SM4500NC)	500	1 x 500-mL HDPE	B3	0 to 6 °C; H2SO4 to pH <2	
Dissolved phosphorus (SM4500P) Dissolved nitrate/nitrite (SM4500NO3) Dissolved TKN (SM4500NC)	500	1 x 500-mL HDPE	B3	0 to 6 °C; H2SO4 to pH <2	
Dissolved cyanide (9012A)	250	1 x 250-mL HDPE	B3	0 to 6 °C; NaOH to pH >12	
DOC (SM5310C) POC (9060 Modified/Lloyd Kahn with filtrate)	500	1 x 500-mL glass or HDPE	A	0 to 6 °C; store in the dark	
VOCs (USEPA 8260B)[5]	120	3 x 40-mL VOA vial	A	0 to 6 °C; HCl to pH <2	
Herbicides (8151A)[5]	2,000	2 x 1-L amber glass with Teflon-lined lid	B4	0 to 6 °C; store in the dark	
BOD_5 (SM 5210B)	500	1 x 500-mL HDPE	B4	0 to 6 °C	EnviroTest Laboratory 315 Fullerton Avenue Newburgh, New York 12550
BOD_{30} (SM5210C)	500	1 x 500-mL HDPE	B4	0 to 6 °C	
209 PCB congeners and homolog groups (1668A)[3]	2,000	2 x 1-L amber glass with Teflon-lined lid	A	0 to 6 °C; store in the dark	SGS Analytical Perspectives 5500 Business Drive, Wilmington, North Carolina 28405
Dioxins and furans (1613B)	1,000	1 x 1-L amber glass bottle with Teflon-lined lid	A	0 to 6 °C; store in the dark	
Total mercury (1631)	250	1 x 250-mL FLPE	A	BrCl in excess until yellow color is evident or using starch iodide paper	Eurofins Frontier Global Sciences 11720 North Creek Parkway North, Suite 400 Bothell, Washington 98011
Dissolved mercury (1631)	250	1 x 250-mL FLPE	A	BrCl in excess until yellow color is evident or using starch iodide paper	
Methyl mercury (1630)	250	1 x 250-mL glass or FLPE	A	0 to 6 °C; freshwater 4-5-mL 11.6M HCl; saline 2-mL/L 9M H2SO4	

Table B10-4
Point Sources Analytical Summary

Analytical Group[1]	Minimum Volume[6] (mL)	Container	Analyte Priority Group[2]	Preservation Requirements	Laboratory
SSC (ASTM 3977)	500	1 x 500-mL HDPE	B4	0 to 6 °C; store in the dark; weigh entire sample bottle to nearest 0.1 g and record weight upon receipt at laboratory	GeoTesting Express 1145 Massachusetts Avenue Boxborough, Massachusetts 01719
Grain size (laser diffraction)	500	1 x 500-mL HDPE	B4	0 to 6 °C	Analytical Resources, Inc. (ARI) 4611 S 134th Place No. 100 Tukwila, Washington 98168
Point Sources Water – Dissolved/Particulate[7]					
PAHs and alkyl PAHs – particulate and dissolved fractions (8270C/D-SIM)	73.8 L (minimum)[10]	Sample will be couriered to Alpha Analytical laboratory in 6.5-gallon glass carboys for filtering and processing prior to analysis.	A	0 to 6 °C; store in the dark	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
Percent solids – particulate fraction (SM2540G)			A	0 to 6 °C	
Dioxins and furans – particulate and dissolved fractions (1613B)[9]			A	0 to 6 °C; store in the dark	SGS Analytical Perspectives 5500 Business Drive Wilmington, North Carolina 28405
Organochlorine pesticides – particulate and dissolved fractions (8081B)[9]			B1	0 to 6 °C; store in the dark	
209 PCB congeners and homolog groups – particulate and dissolved fractions (1668A)			A	0 to 6 °C; store in the dark	
Point Sources Solids – Bulk Sampling					
Grain size (laser diffraction)	500	1 x 500-mL HDPE	A	0 to 6 °C	Analytical Resources, Inc. (ARI) 4611 S 134th Place No. 100 Tukwila, Washington 98168
Total metals (6010C/6020A/1632)	500	1 x 500-mL HDPE	A	0 to 6 °C; nitric acid to pH <2	Alpha Analytical Woods Hole Division 320 Forbes Boulevard Mansfield, Massachusetts 02048
Dissolved metals (6010C/6020A/1632)	500	1 x 500-mL HDPE	A	0 to 6 °C; nitric acid to pH <2	
POC (9060 Modified/Lloyd Kahn with filtrate)	500	1 x 500-mL HDPE	A	0 to 6 °C; store in the dark	
Percent solids – particulate fraction (SM2540G)	73.8 L (minimum)[4]	Sample will be couriered to Alpha Analytical laboratory in 3 x 6.5-gallon glass carboys for filtering and processing prior to analysis.	A	0 to 6 °C	
PAHs and alkyl PAHs – particulate fraction (8270C/D-SIM)			A	0 to 6 °C; store in the dark	
Dioxins and furans – particulate fraction (1613B)[8]			A	0 to 6 °C; store in the dark	SGS Analytical Perspectives 5500 Business Drive Wilmington, North Carolina 28405
Organochlorine pesticides – particulate fraction (8081B)[8]			B1	0 to 6 °C; store in the dark	
209 PCB congeners and homolog groups – particulate fraction (1668A)			A	0 to 6 °C	

Notes:
1 = Refer to Phase 2 QAPP Worksheet No. 15 for a complete analyte list and target reporting limits.
2 = In cases of limited sample volume, highest priority is given to the analytes in Group A, and lowest priority is given to analytes in Group B.
3 = Total PAHs, PCBs, dioxins/furans, and organochlorine pesticide analyses will not be conducted on whole-water samples from locations that are also analyzed for dissolved and particulate PAHs, PCBs, dioxins/furans, and organochlorine pesticides.
4 = Because only one round of bulk-water samples will be collected, a factor of safety of two was applied to the particulate sample volume required.
5 = Laboratory analysis of these samples for the first round will be completed as quickly as feasible so that USEPA and the NCG can evaluate if additional sampling events are necessary.
6 = The minimum volumes for whole-water analysis of PAHs and alkyl PAHs, SVOCs, n-alkanes, and isoprenoids including DRO and TPH ranges, organochlorine pesticides, herbicides, and PCB congeners includes an additional 1-L sample bottle in the event of breakage or other analysis issues. In cases where sample volume is limited, only one 1-L sample bottle may be submitted to the laboratory for these analyses.
7 = Dissolved/particulate fractions will be measured from a subset of sampling locations in each category to the extent feasible. Results of the first round of sampling will help determine which sampling locations have discharge conducive to dissolved/particulate analysis.
8 = Bulk-water samples will be analyzed for the particulate fraction of dioxins/furans and organochlorine pesticides if there is sufficient sample mass in addition to the mass required for analysis of percent solids, PAHs, POC, and PCBs.
9 = Dissolved/particulate samples will be analyzed for dioxins/furans and organochlorine pesticides if there is sufficient sample volume/mass in addition to the mass required for analysis of percent solids, PAHs, and PCBs.
10 = This minimum volume is based on a TSS concentration of 200 mg/L. Actual required sample volumes will be calculated based on the results of the initial sampling events at each location.

Table B10-5
Example Point Sources Wet-Weather Sampling Schedules[1]

Point Sources Discharge Category	Outfall ID	Location/DAR Site Name	Precipitation Threshold (forecasted, inches)	Small Storm[2]							Large Storm[3]									Total No. of Sampling Events
				1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	
Category 1 – Individually Permitted Stormwater Discharges[4]	NY0267724-001	ExxonMobil Greenpoint Remediation Project (DAR No. 53)	0.2		1		2						1		2					4
	NCB-006131-001	Motiva Brooklyn Terminal (DAR No. 50)	0.2	1				2			1								2	4
	NCB-0004596-001	BP Products N America Brooklyn Terminal (DAR No. 48)	0.2			1			2					1		2				4
	NY0200841-002	Queens District 5/5a Garage (DAR No. 45)	0.2		1				2			1					2			4
	BB-0028452-001	Getty Terminals Corp. #58220 (DAR No. 47)	0.2		1			2					1					2		4
Category 2A – Combined Sewer Discharges	BB-026	Long Island City Interceptor System	0.4	N/A								1		2		3		4		4
	BB-009	Long Island City Interceptor System	0.5	N/A									1	2		3			4	4
	NCB-083	Morgan Avenue Interceptor System	0.1			1			2			1					2			4
	NCB-015	Morgan Avenue Interceptor System	0.4	N/A							1	2			3			4		4
	NCQ-077	Morgan Avenue (via secondary interceptor)	0.3	1			2				1	2								4
	NCQ-029	Morgan Avenue (via secondary interceptor)	0.3		1			2					1		2					4
	NCB-022	West Street Interceptor System	0.4	N/A									1		2		3	4		4
Category 2B – WPCP Treated Effluent	NCB-002	Newtown Creek Water Pollution Control Plant overflow	0.4	N/A							1			2		3			4	4
Category 3A – MS4 and Major Stormwater Discharges	NCB-629	Near terminus of English Kills	0.2	1			2				1						2			4
	NCQ-632	East Branch, near Grand Street Bridge, Queens side	0.2			1			2						1		2			4
	O-185	Between Greenpoint Avenue and Apollo Street, Brooklyn side	0.2	1				2				1						2		4
	NCQ-633	Newtown Creek, Queens side, near confluence with English Kills	0.2			1		2					1			2				4
	NCQ-637	Near Calvary Cemetery	0.2		1				2					1				2		4
	N/A[5]	Meeker Avenue – Overland Flow	0.2	1						2			1						2	4
	BB-610[6]	Terminus of Dutch Kills	0.2			1				2				1					2	4
Category 3B – Highway Drains	LIE-001	Runoff from Long Island Expressway	0.2	1			2				1						2			4
Category 3C – Direct Discharges from Individual Sites	HN-002[5]	Hugo Neu Schnitzer (aka SIMS Hugo Neu; DAR No. 125)[1]	0.2				1		2			1							2	4
	O-193	Review Avenue Development I (DAR No. 41)	0.2			1			2					1			2			4
	O-202	Waste Management of NY/Steel Equities (formerly POW; DAR No. 54)/Town, County and State Recycling, Inc. (aka Review Avenue Recycling, Inc.; DAR No. 145)	0.2		1			2				1						2		4
	O-55	Empire Merchants/Former Paragon Oil Terminal (DAR No. 200)	0.2			1				2					1	2				4
	NG-001	Greenpoint Energy Center (DAR No. 32)	0.2		1		2						1				2			4
	O-135	Former Laurel Hill Site (DAR No. 16)	0.2	1			2				1							2		4
	NCQ-442	Maspeth Concrete Loading – Metropolitan Avenue (DAR No. 210)	0.2			1		2							1				2	4
	NCB-0005789-001	Malu Properties/Former Ditmas Oil/ Former Gulf Oil Terminal (DAR No. 123)	0.2		1			2			1					2				4
	NCB-432	Newtown Creek WPCP (DAR No. 11a)	0.2	1					2						1				2	4
WPCP	N/A	Newtown Creek WPCP[7] (wet weather)	0.1				1							1		1				3
			Total No. of Sampling Events	8	8	8	8	8	8	3	8	8	8	8	8	8	8	8	8	

Notes:
1 = As discussed in Section 10.5, logistical issues as well as projected rainfall amounts will limit which outfalls can be sampled during a given storm. To the extent possible, a combination of categories (i.e., Categories 1, 2, and 3) will be sampled during each event.
2 = Small storms are storms forecasted to be between 0.2 inch and 0.5 inch.
3 = Large storms are forecasted to be 0.5 inch or more.
4 = Category 1 treated groundwater effluent will be sampled during dry weather.
5 = Discharge to Newtown Creek via overland flow.
6 = Proposed as a potential sampling location pending the results of reconnaissance.
7 = The Newtown Creek WPCP is a water pollution control plant influent sampling location.

FIGURES

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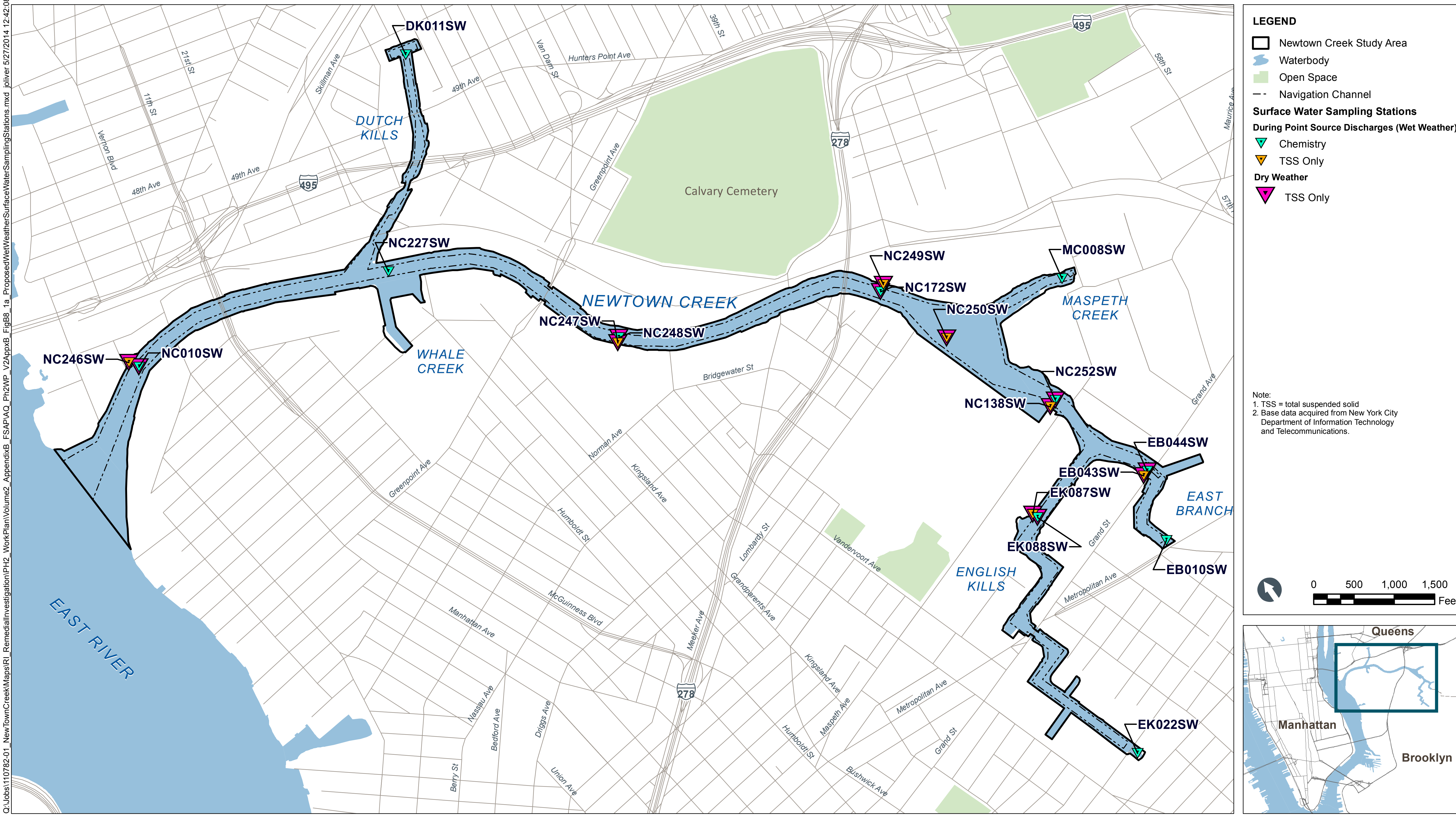
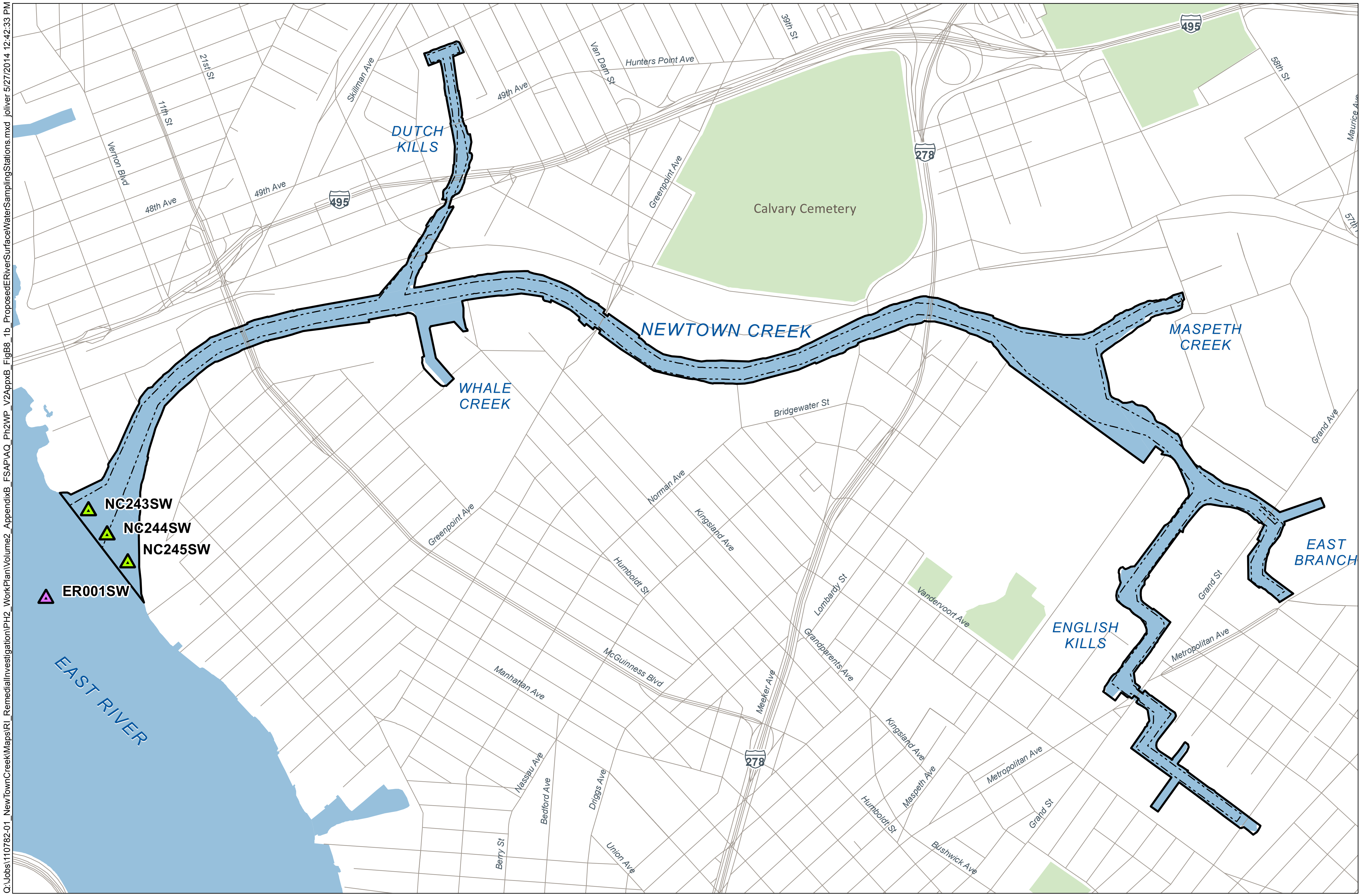


Figure B8-1a
Proposed Surface Water Sampling Stations –
Point Source Discharge Events and Total Suspended Solids
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

ANCHOR QEA



LEGEND

- Newtown Creek Study Area
- Waterbody
- Open Space
- Navigation Channel
- East River Sample Station[2]
- Discrete Stations for Newtown Creek Composite Sample[3]

Note:
1. Base data acquired from New York City Department of Information Technology and Telecommunications.
2. Ten monthly sampling events, flood tide only.
3. Ten monthly sampling events:
   7 events - composite sampling (4 at flood tide only; 3 at flood tide and ebb tide)
   3 events - discrete sampling (at flood tide only)

0 500 1,000 1,500 Feet

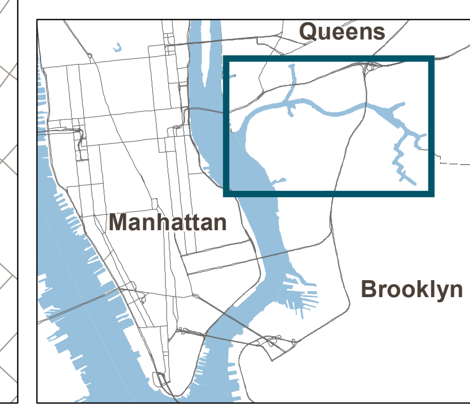


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Figure B8-1b

Proposed Surface Water Sampling Stations – East River

Phase 2 FSAP – Volume 2

Newtown Creek RI/FS

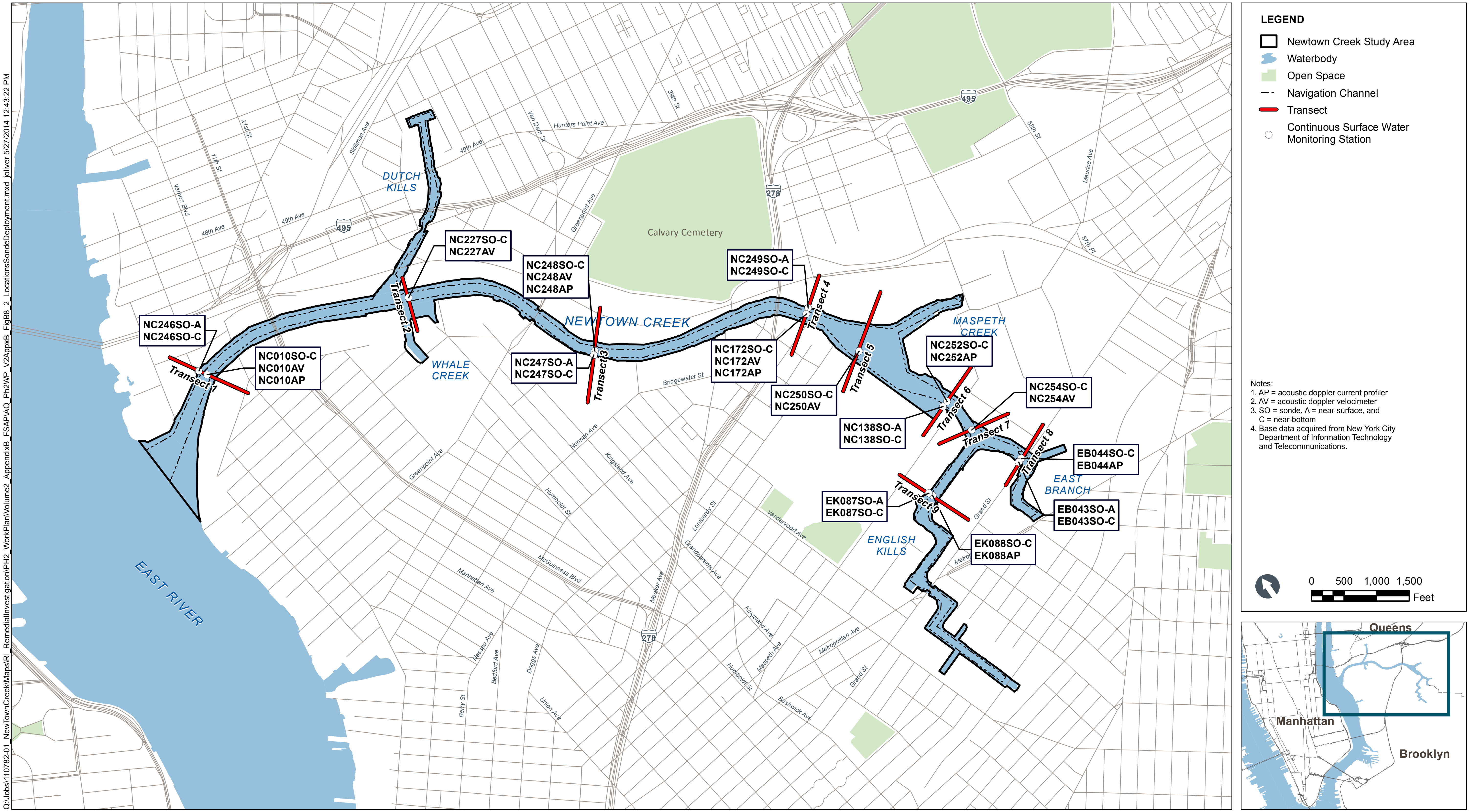

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Figure B8-2
Proposed Continuous Surface Water Monitoring and Current Meter Stations
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

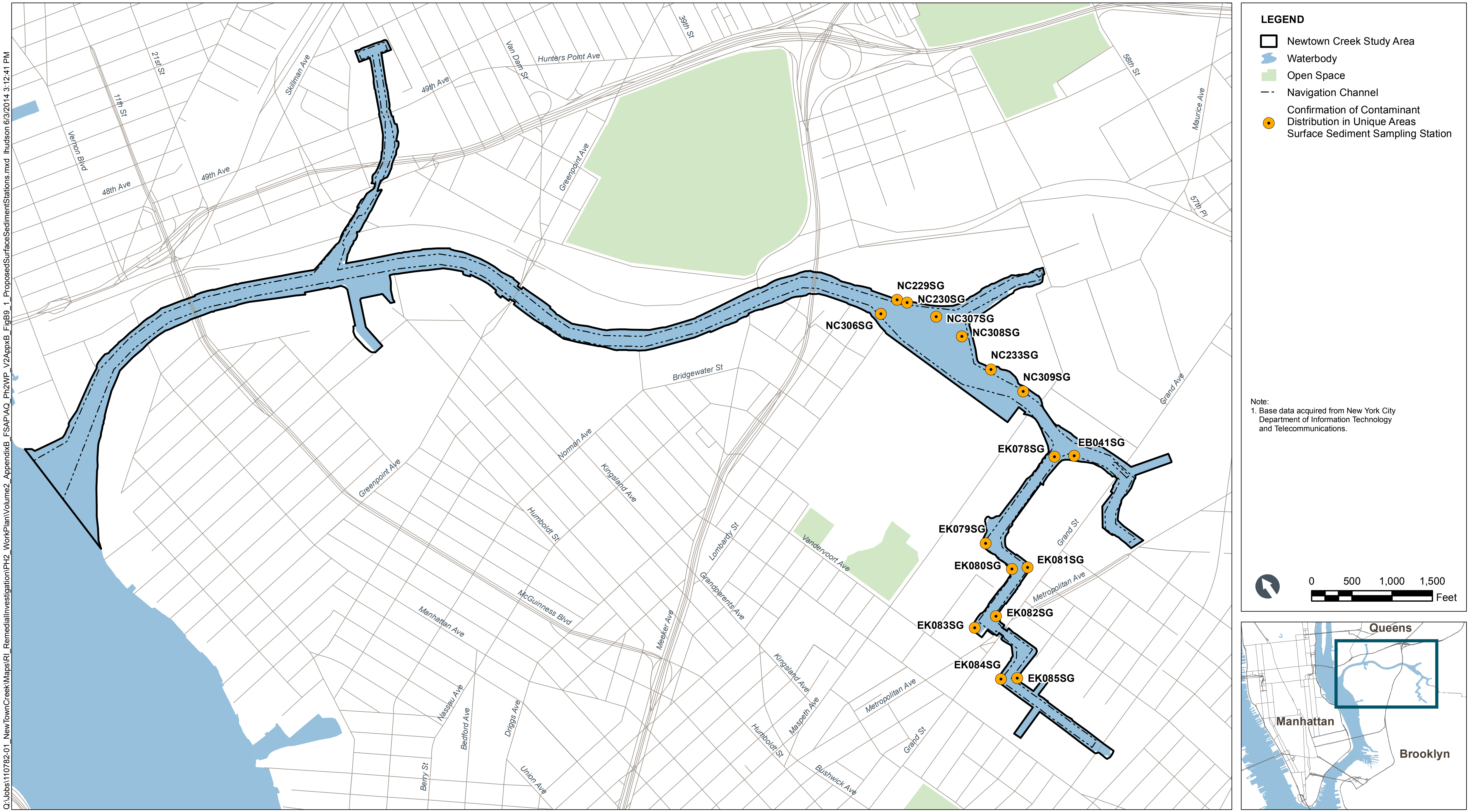

Figure B9-1

Proposed Surface Sediment Sampling Stations –
Confirmation of Contaminant Distribution in Unique Areas
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

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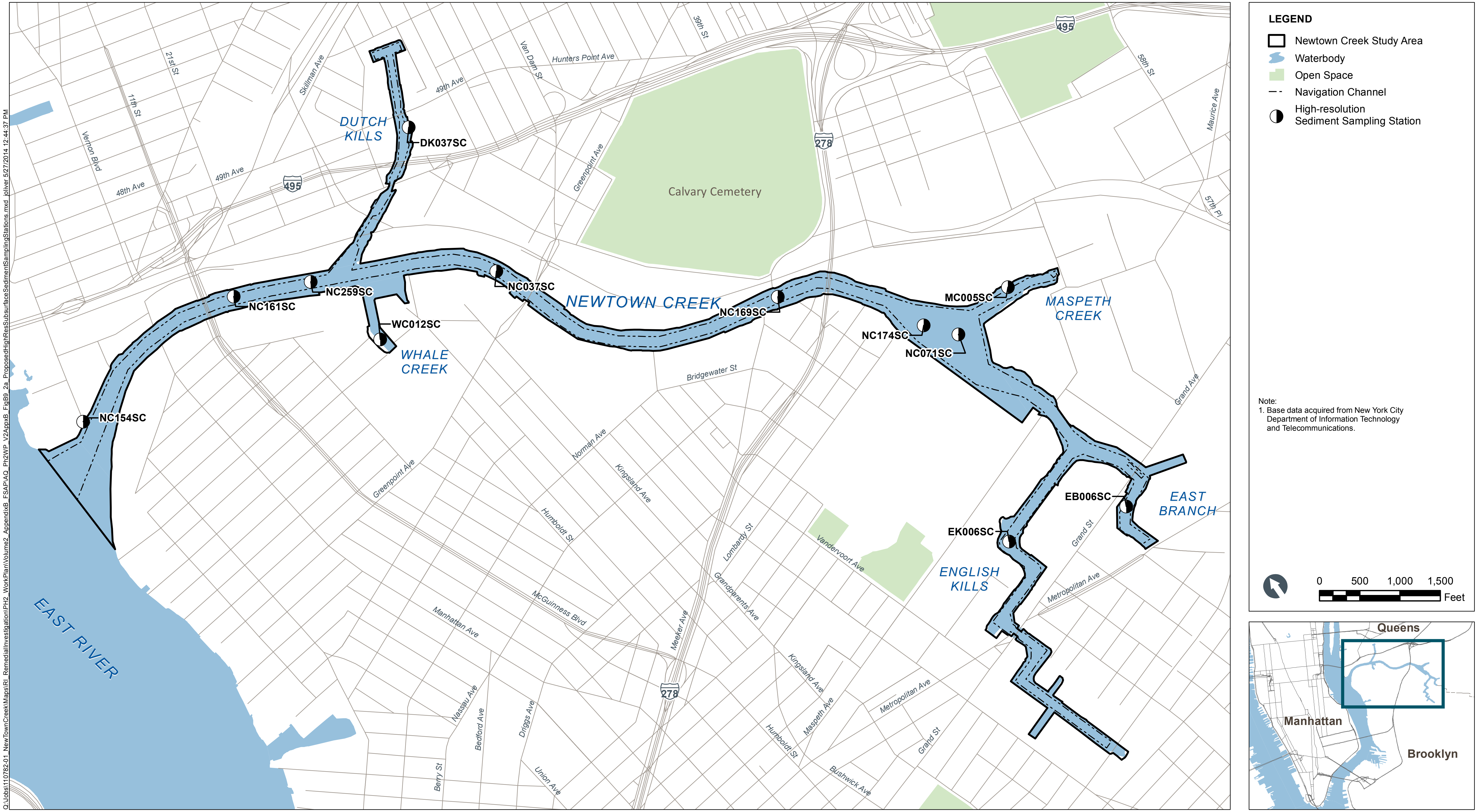

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Figure B9-2a
Proposed Sediment Sampling Stations – High Resolution
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

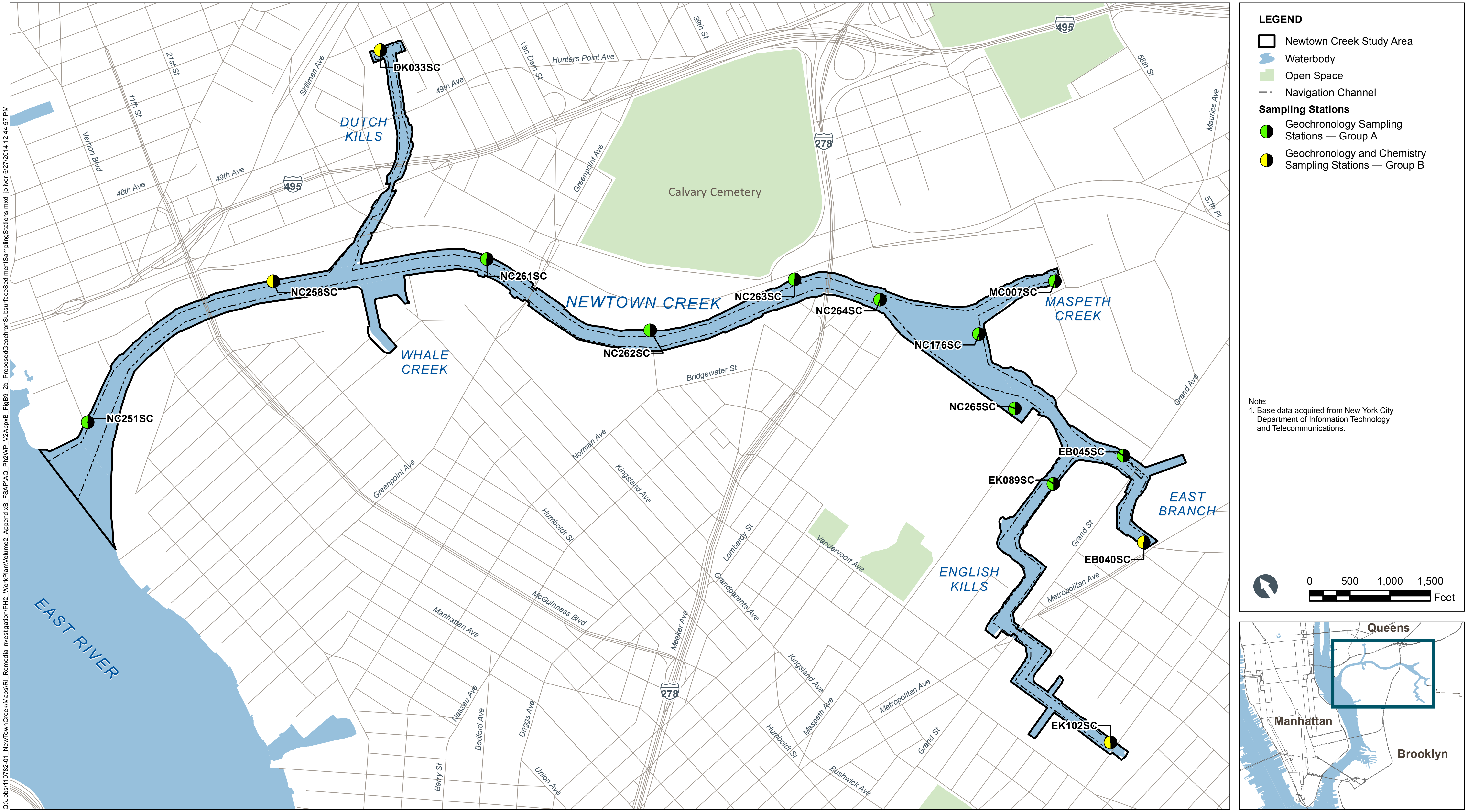

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Figure B9-2b
Proposed Sediment Sampling Stations – Geochronology and Chemistry
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

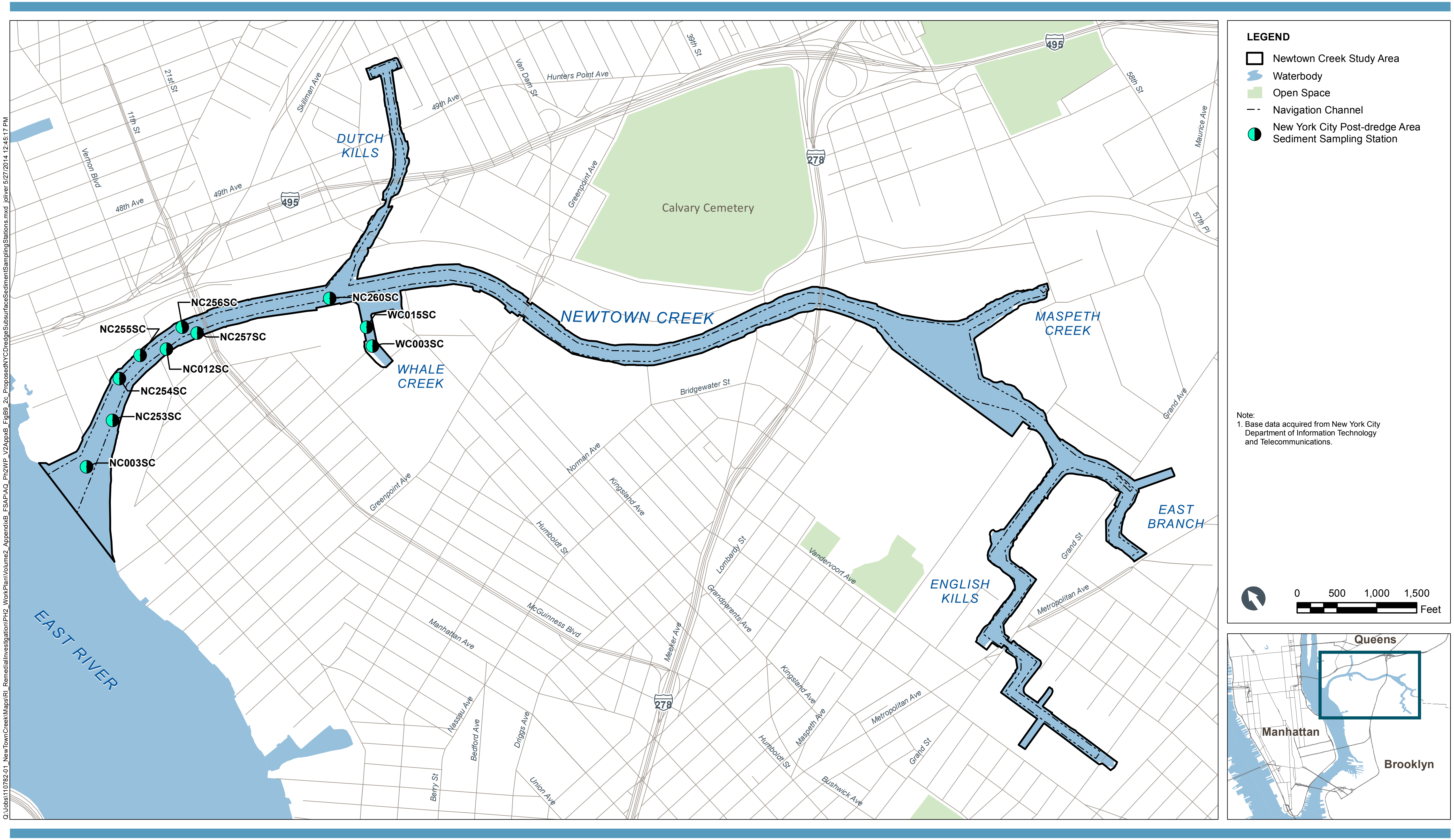

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Figure B9-2c
Proposed Sediment Sampling Stations – New York City Post-Dredge
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

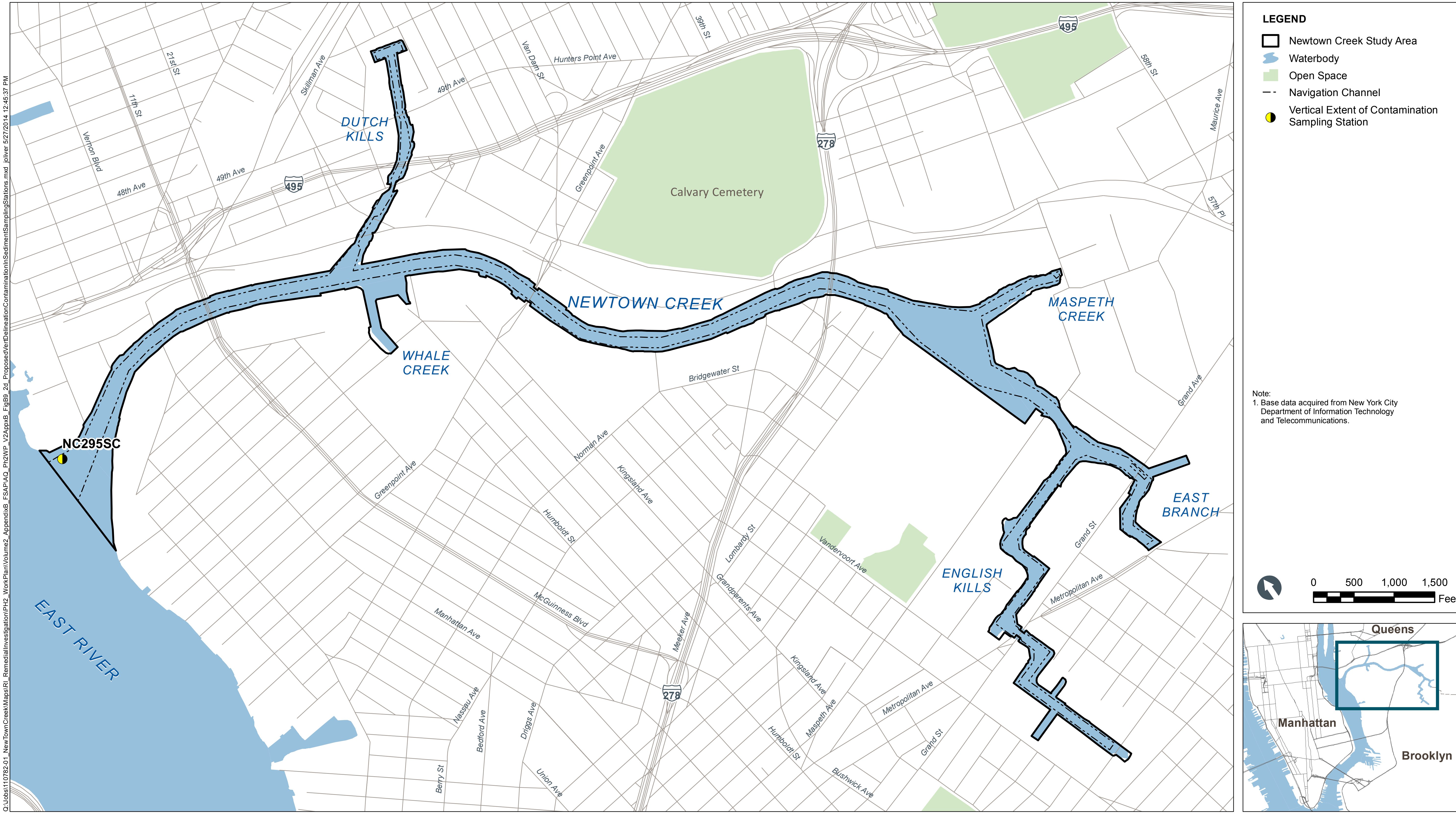

Figure B9-2d
Proposed Sediment Sampling Stations –
Vertical Extent of Contamination
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

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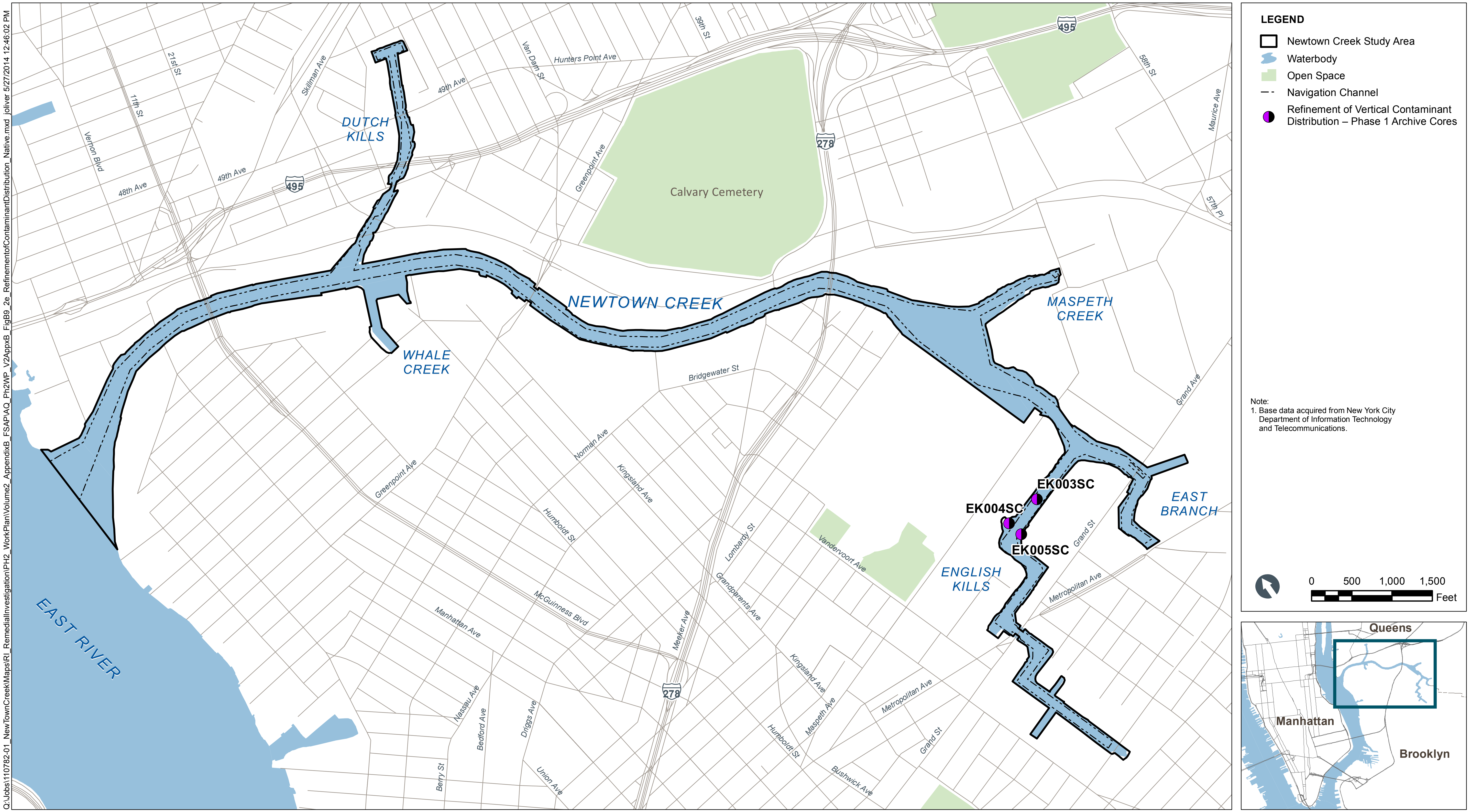

Figure B9-2e
Proposed Sediment Sampling Stations –
Refinement of Vertical Contaminant Distribution
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

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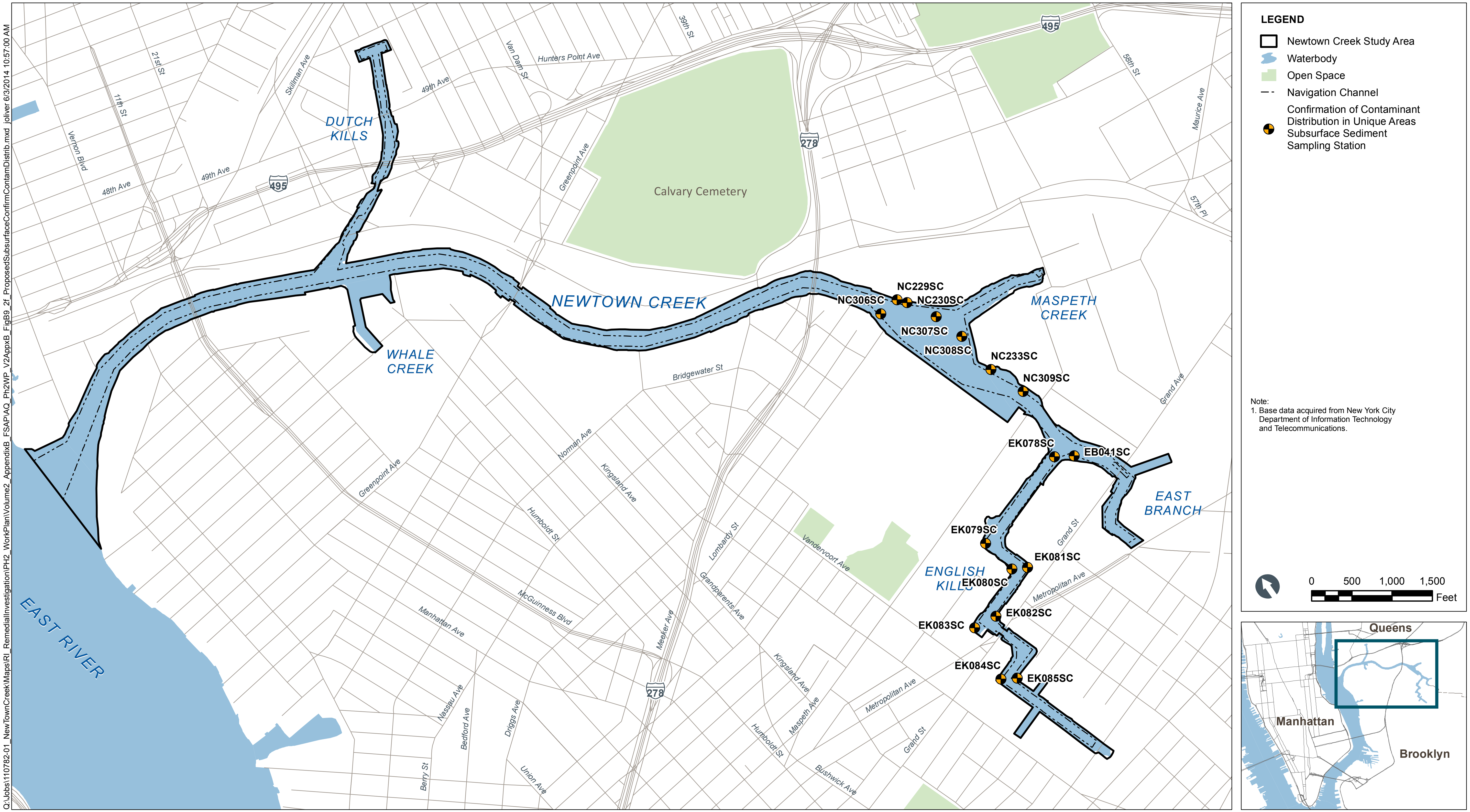

ANCHOR QEA

Figure B9-2f
Proposed Sediment Sampling Stations –
Confirmation of Contaminant Distribution in Unique Areas
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

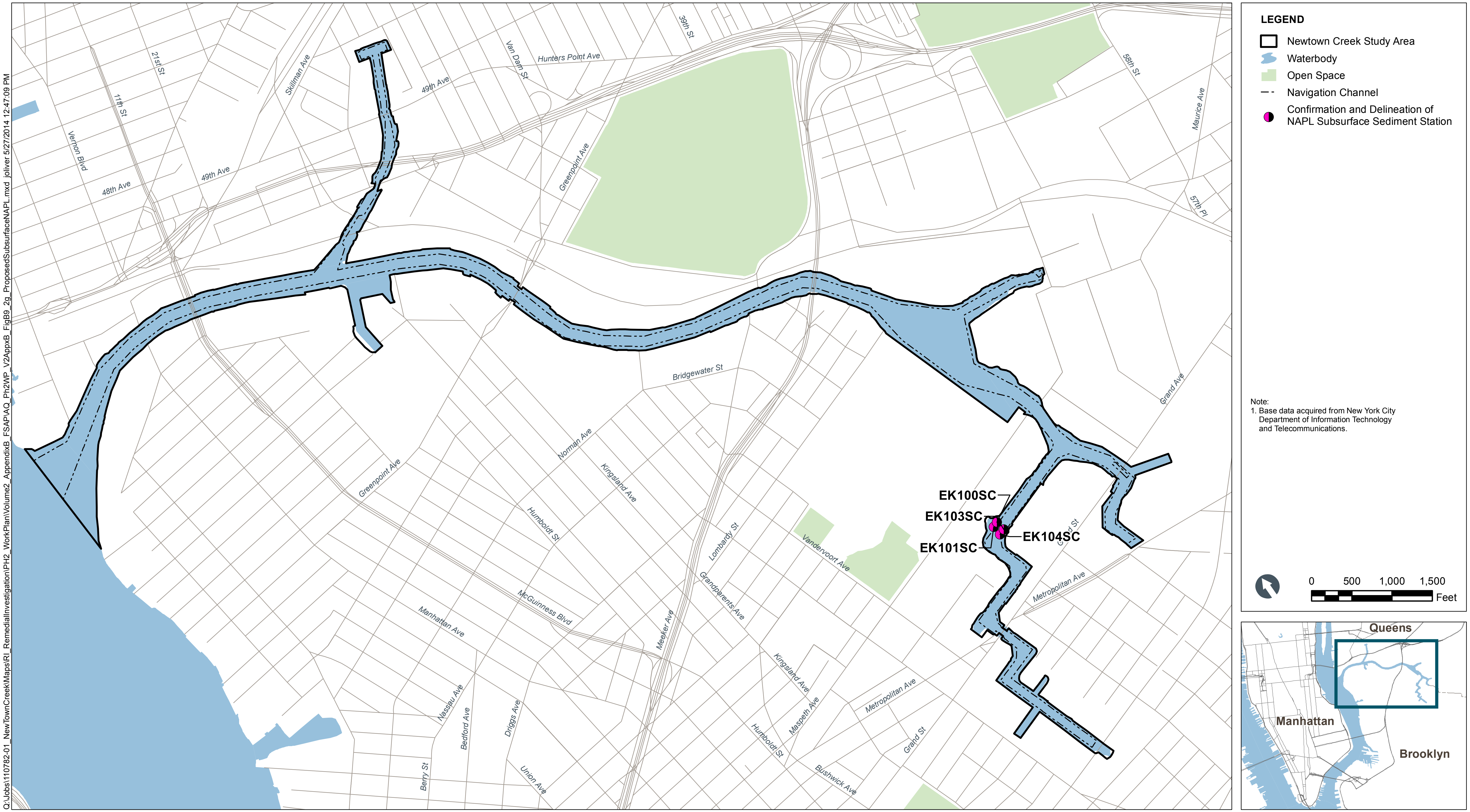

Figure B9-2g
Proposed Surface Sediment Sampling Stations –
Confirmation and Delineation of NAPL
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

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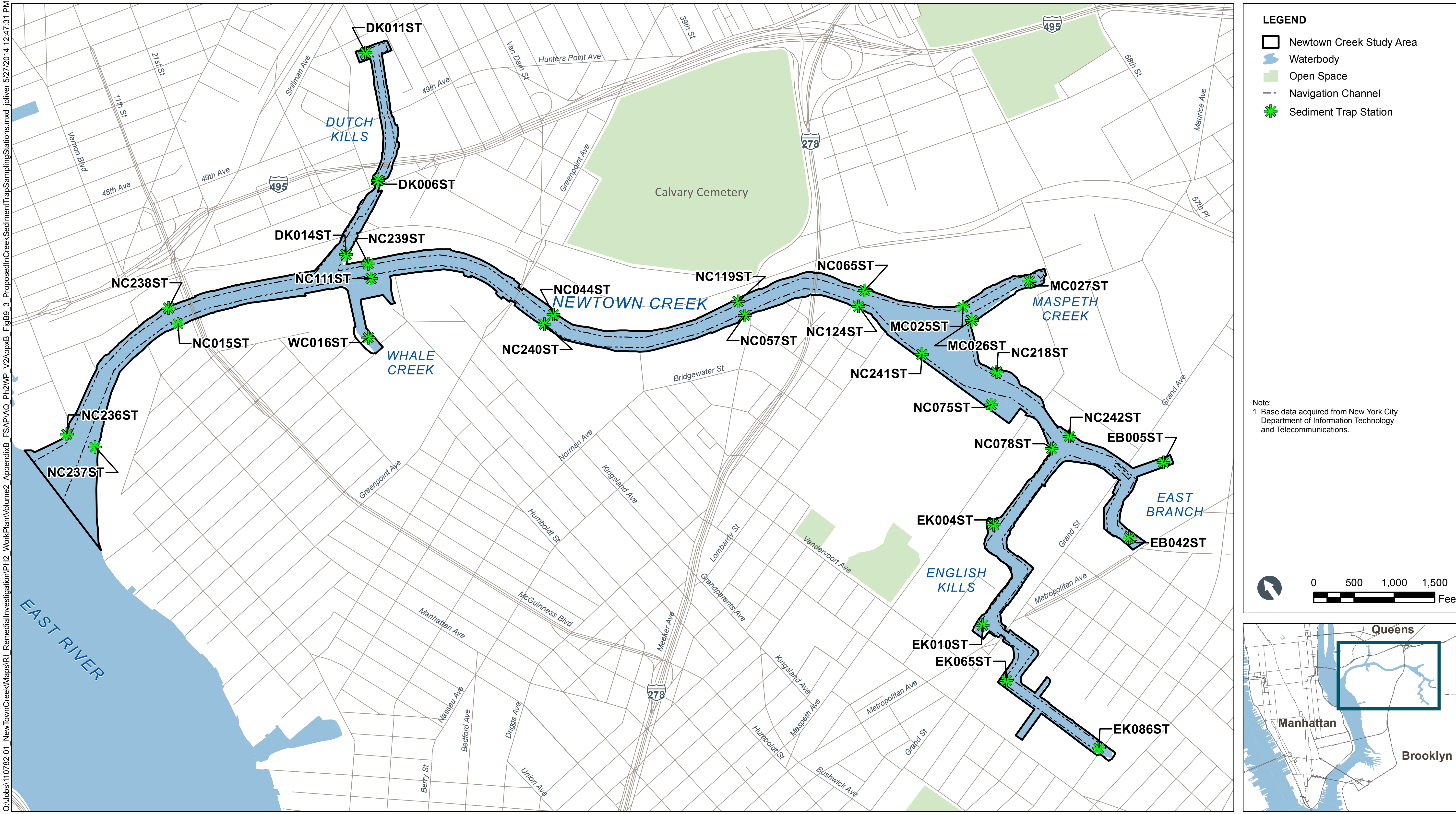

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Figure B9-3
Proposed Stations for Deployment of Sediment Traps
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

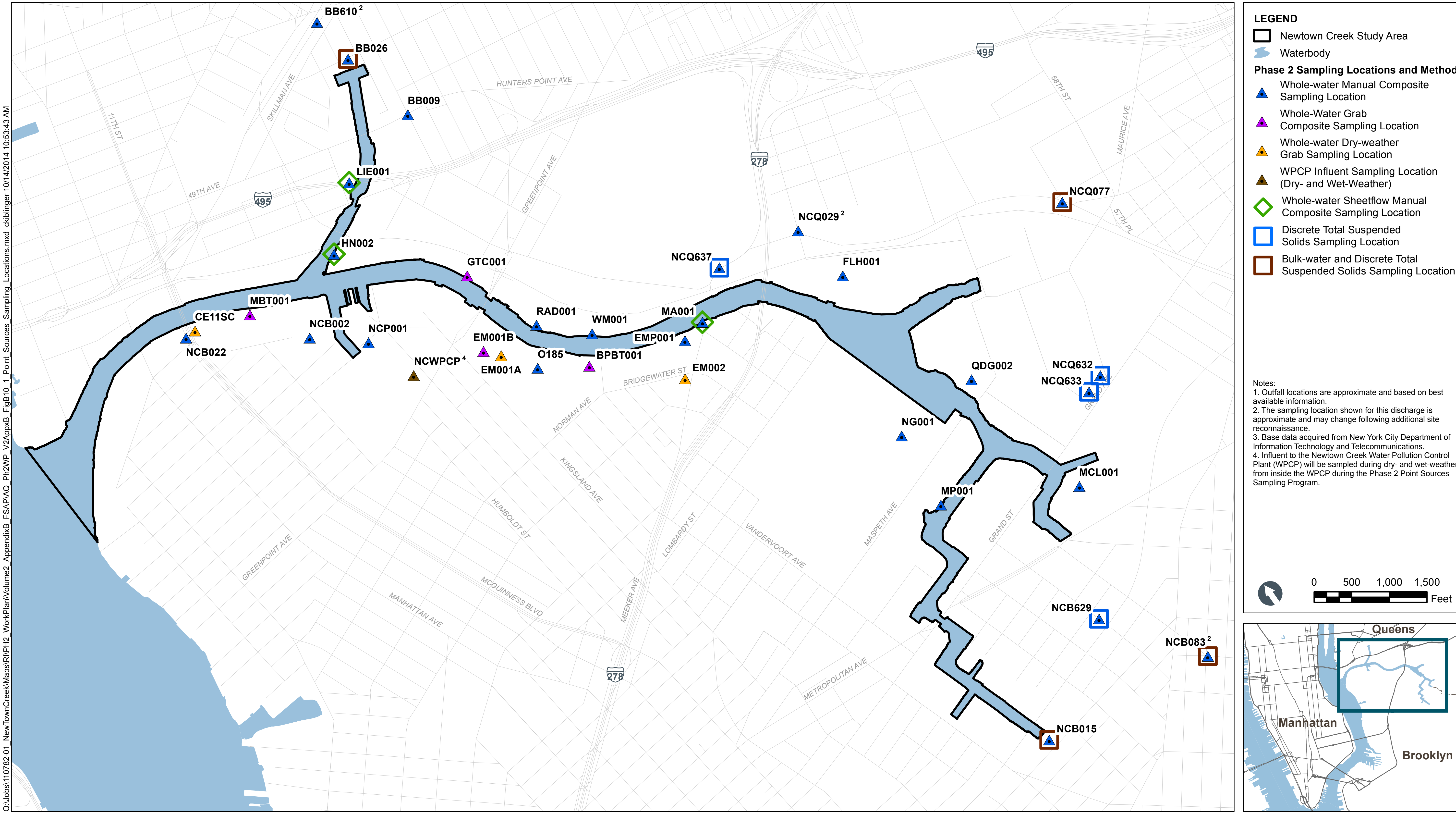


Figure B10-1
Proposed Point Source Sampling Locations and Methods
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

ANCHOR QEA

ATTACHMENT 1
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE NC-18 – CURRENT METER DEPLOYMENT AND DATA COLLECTION

Newtown QAPP DRAFT

Prepared by:

Sea Engineering, Inc.
200 Washington Street, Suite 101
Santa Cruz, CA 95060

Tel: (831) 421-0871
Fax: (831) 421-0875

INSTRUMENT DEPLOYMENT

Sea Engineering, Inc. (SEI) will provide data support for modeling studies in the Newtown Creek area: (1) Hydrodynamic and Sediment Transport (hydro and sedtran) and (2) Propeller Wash (propwash). As part of the hydrodynamics and sediment transport model data support activities, six water quality monitoring stations will be installed. Four near-bed current velocity meters will be deployed for propeller wash model data support.

Hydrodynamic and Sediment Transport

Six hydro and sedtran stations will be deployed. Each station will contain an instrumented installation with a water quality meter near the surface and near the bottom (depths to be determined), anchored to a left or right bank piling (or similar structure). Additionally, a bottom-mount platform will be deployed near the center of the channel at each station (location to be determined) and equipped with water quality sonde and acoustic Doppler current profiler (ADCP). Each integral component of the hydro and sedtran moorings will have standard complements of field replaceable components and consumables and will be calibrated and validated according to manufacturer specifications. Instrumentation procedures are outlined in the following sections.

Each hydro and sedtran station will be fitted with three YSI (Yellow Springs Incorporated) 6-series sondes. Each sonde will measure optical turbidity (units of NTU), temperature, dissolved oxygen, conductivity, and depth near the bottom and near the water surface. Two instruments will be fixed to an aluminum frame or PVC “well” with adequate baffling for accurate sampling at each depth anchored to structures along the Creek (bank mounted platform) and one will be attached to a bottom-mount platform (center channel deployment). The ADCPs will provide current velocity profiles from near bottom to near surface. Each station will be held in place by clamps or mooring line affixed to a structure. The sondes will be mounted for quick-disconnect for easy servicing. A sample bank mounting configuration is shown in Figure 1 and Figure 2 shows a sample bottom-mount platform.

Figure 1. Typical "well" for deployment of water quality instrumentation to a hard structure.

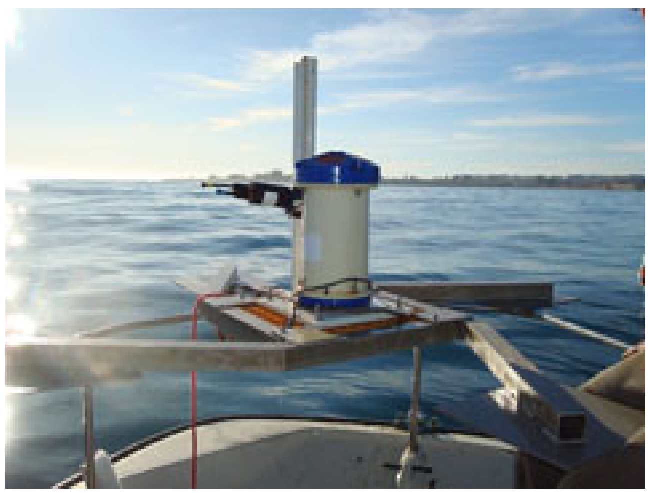


Figure 2. Sample ADCP bottom-mount platform with water quality sonde.

The sampling frequency for the instruments will be maximized for the expected deployment duration and memory capacity. During a 120 day water quality sonde deployment, measurements collected every 15 minutes will require approximately monthly change of batteries and servicing of the instruments to clean any biofouling. ADCPs can be configured to make measurements every 10 minutes, requiring a bimonthly change of batteries.

Propeller Wash

Four propwash stations will be installed, three of which coincide with the hydro and sedtran stations. Each propwash station will include a bottom-mount platform equipped with an acoustic Doppler velocimeter (ADV) and water quality sonde (if necessary). The ADVs will measure current velocity near the sediment bed at a relatively high burst sampling rate (10 seconds every 1 or 2 minutes). ADVs will require monthly servicing. A sample ADV bottom-mount platform is shown in Figure 3.

Figure 3. Example bottom-mount ADV platform with water quality sonde.

INSTRUMENT CALIBRATION

The following subsections review instrument calibration and frequency information.

Calibration Procedures

For water quality measurements, field equipment requiring calibration includes: optical turbidity, dissolved oxygen, and conductivity probes on the water quality meters. All instrumentation will be calibrated prior to deployment and following recovery. Any instrument “drift” from prior calibration will be recorded in a field notebook.

Calibration of water quality probes will be performed by experienced engineering staff in accordance with procedures and schedules outlined in the YSI operations and maintenance manual using manufacturer-supplied and certified calibration standards. Optical turbidity instrumentation will be calibrated in NTU appropriate for the project site. The standard YSI two-point turbidity calibration technique (0 NTU and 12.7 NTU) will be used. Conductivity probes will be calibrated to 50,000-microSiemen-per-centimeter conductivity standards. All calibration solutions are NIST traceable.

Prior to each deployment of the ADCPs and ADVs, each unit will be tested and calibrated to ensure proper operation. Instrument diagnostic self-check procedures will be implemented for all current meter equipment. Pressure sensors will be zeroed under the effects of the local barometric pressure. The internal compasses will be validated by completing a compass calibration and/or verification test, ensuring proper compass operation. Note that the transducers are calibrated in the factory and do not require additional calibration. The instruments must pass all tests prior to deployment.

Calibrated equipment will be uniquely identified by using either the manufacturer's serial number or other means. A label with the identification number and the date when the next calibration is due will be physically attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. In addition, the results of calibrations and records of repairs will be recorded in a logbook. Scheduled periodic calibration of testing equipment does not relieve field personnel of the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, the device must be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed, or a substitute piece of equipment can be obtained. Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use, or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed recalibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented and the task manager and QA/QC reviewer will be notified.

DATA ANALYSIS

Raw data will be recovered from the instruments and backed up to DVD/CD media and hard disk to safeguard the data. Data will be pre-processed with the manufacturer's processing software and noted for presence. Quality of the data will be verified through consistent QA/QC measures. Data will undergo additional statistical and time series analyses according to project protocol. Plots of time series data will be produced for each deployment site.

QUALITY CONTROL ASSURANCE

Although great care will always be taken, quality control will be performed routinely throughout the project duration to assess the health of any subsurface instrumentation. Instrument functions will be tested and verified prior to shipment to the site and again upon arrival at the project site. Instrument functionality will be verified frequently at specified intervals during the project. Periodic maintenance will ensure that external interference (i.e. biofouling) does not contaminate the data.

During periodic assessments, the instrument battery life and available memory will be assessed. Batteries will be replaced as necessary and the data card memory will be cleared as necessary. Typical instrument maintenance will be conducted as required (e.g. clearing of biofouling). Each instrument is designed as a field device and, as such, is a fairly robust system. Integral components of the instrument systems have a standard complement of field replaceable components that are shipped with the systems for field replacement if necessary.

Data will be downloaded during the periodic instrument assessments. The quality of the downloaded data will be assessed immediately and proper measures will be taken to correct any data deficiencies. The data will undergo consistent strict quality control after the measurements have been downloaded from the instruments. Data are backed up on a separate hard disk and DVD/CD media for safekeeping. Results from standard pre- and post-processing routines will be analyzed for accuracy. Data outliers will be removed prior to a statistical analysis.

Instrument Description

- YSI Water Quality Sondes

Parameter	Range	Resolution	Accuracy
Dissolved Oxygen % Saturation	0 to 500%	0.1%	0 to 200%: ±2% of reading or 2% air saturation, whichever is greater; 200 to 500%: ±6% of reading
Dissolved Oxygen mg/L	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: ± 0.2 mg/L or 2% of reading, whichever is greater; 20 to 50 mg/L: ±6% of reading
Conductivity	0 to 100 mS/cm	0.001 to 0.1 mS/cm (range dependent)	±0.5% of reading + 0.001 mS/cm
Salinity	0 to 70 ppt	0.01 ppt	±1% of reading or 0.1 ppt, whichever is greater
Temperature	-5 to +50°C	0.01°C	±0.15°C
Depth	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.06 ft, ±0.02 m
Turbidity	0 to 1000 NTU	0.1 NTU	+/-2% of reading or 0.3 NTU, whichever is greater

- ADCPs and ADVs

Parameter	Range	Resolution	Accuracy
Teledyne RD Instruments ADCPs (Workhorse Sentinel)			
Current Velocity	+/-20 m/s (max)	0.1 cm/s	0.3% of water velocity relative to ADCP +/-0.3 cm/s
Nortek ADV			
Current Velocity	+/- 10 m/s		1% of measured value +/-0.5 cm/s
Sontek Argonaut ADV			
Current Velocity	+/-0.001 – 4.5 m/s	0.0001 m/s	+/-1% of measured velocity, +/-0.001 m/s
Sontek OceanHydra ADV			
Current Velocity	Programmable up to 500 cm/s	0.1 cm/s	+/-1% of measured velocity, +/-0.5 cm/s at up to 25 Hz

STANDARD OPERATING PROCEDURE NC-19 – SEDIMENT AND NATIVE MATERIAL CORE COLLECTION

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of sediment and native material core samples for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Sediment and native material samples for chemistry testing will be collected by vibracore or sonic drilling methods. The appropriate collection method will be specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a) specific to the purpose of the sediment core collection. If necessary due to sample volume requirements, a piston-core or other direct-push method may be used to supplement sediment-mass requirements in surface sediment intervals or to collect cores in areas that are not accessible using a boat capable of deploying a vibracore or sonic-drilling unit. Core processing and sample collection procedures are described in SOP NC-20 – Sediment and Native Material Core Processing.

Procedures for sediment and native material core collection sampling outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Log and in a Field Deviation Form (see SOP NC-01 – Field Records).

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* (Anchor QEA 2014c), and the corresponding documents (i.e., Phase 2 FSAP Volume 2, Phase 2 HASP, and *Phase 2 Quality Assurance Project Plan* [Phase 2 QAPP]; Anchor QEA 2014a, 2014b, and 2014d, respectively). All field personnel are required to take a 40-hour Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response training course and annual refresher courses as well as participate in a medical monitoring program prior to engaging in core collection activities. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions.

- Sampling vessel equipped with necessary differential global positioning system (DGPS) navigation and communication equipment
- Approved documents including Phase 2 FSAP Volume 2, Phase 2 HASP, and Phase 2 QAPP (Anchor QEA 2014a, 2014b, and 2014d, respectively)
- Sample coordinates
- Vibracore sampling device or sonic drill rig
- Lexan core tubes and caps
- Tubing cutters
- Core collection field forms
- Duct tape
- Aluminum foil
- Decontamination materials as described in SOP NC-02 – Equipment Decontamination
- Appropriate personal protective equipment and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Lead line
- Tape measure
- Field application

SAMPLING PROCEDURE USING A VIBRACORE

Sediment and native material core samples will be collected by vibracoring methods at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a). Navigation and boat-positioning procedures are described in SOP NC-03 – Navigation and Boat Positioning. Prior to deployment, the following procedures will be used to decontaminate sample tubes:

1. Rinse and pre-clean Lexan core tubes with potable water.

2. Wash and scrub the tubes in a solution of phosphate-free soap (e.g., Alconox) and potable water.
3. Rinse with Study Area water.
4. Seal both ends of each core tube with a decontaminated core cap.

The core cap will be removed immediately prior to placement into the coring device. Care will be taken during sampling to avoid contact of the sample tube with potentially contaminated surfaces.

Sediment and native material core collection will be performed using the following procedures:

1. The vessel will be maneuvered to the proposed sample location (see SOP NC-03 – Navigation and Boat Positioning).
2. A decontaminated core tube the length of the desired penetration depth will be secured to the vibratory assembly head and deployed from the vessel.
3. The cable umbilical to the vibrator assembly will be drawn taut and perpendicular as the core rests on the bottom sediment.
4. The location will be recorded on the appropriate forms by the location control personnel, and depth to sediment will be measured with a survey tape attached to the head assembly and lead line.
5. The core tube will be vibratory-driven into the sediment.
6. A continuous core sample will be collected to the designated coring depth or until refusal.
7. The depth of core penetration will be measured and recorded.
8. The vibrator motor will be turned off and, following a 5-minute wait to allow the core sample to settle if not using a core catcher, the core barrel will be extracted slowly from the sediment using the winch.
9. While suspended from the A-frame hoist, the assembly head and outside of the core barrel will be sprayed off with site water to remove sediment and then placed on the vessel deck.
10. The core sample will be evaluated at the visible ends of the core tube, the length of recovered sediment will be recorded, and, if accepted, the core tube will be sectioned into 4- to 6.5-foot lengths to facilitate delivery to the core-processing location.

Acceptance criteria for sediment core samples are as follows:

- Overlying water is present and the surface is intact.
- The core tube appears intact without obstruction or blocking.
- Recovery is greater than 75 percent of drive length.

If sample acceptance criteria are not achieved, the sample is rejected unless modified acceptance criteria are approved by the Field Team Leader and/or three attempts have been made at the sampling location following guidelines for repeated attempts in SOP NC-03 – Navigation and Boat Positioning.

Anchor QEA personnel will record field conditions and drive notes on a Sediment Core Collection Log (an example is provided in Attachment 1). The logs will include the following information:

- The sample station identification
- Water depth and time of measurement
- Geographic position of the actual coring location as determined by DGPS
- Date and time of collection of each sediment core sample
- Names of field personnel collecting and handling the samples
- Observations made during sample collection, including weather conditions, complications, ship traffic, and other details associated with the sampling effort
- Length of drive penetration and estimated recovery measurements
- Qualitative notation of apparent resistance of sediment column to coring (how the core drove)

Once the core samples are deemed acceptable, the following procedures will be followed:

1. The cutterhead will be removed, and a cap will be placed over the end of the tube and secured firmly in place with duct tape.
2. The core tube will then be removed from the sampler, and the other end of the core tube will be capped and taped.
3. The core tube will be labeled with the sample station number, segment letter, and an arrow pointing to the top of the core.

4. The cores will then be cut into appropriate lengths for transport to the core processing area for processing.
5. The cores will be sealed tightly enough to prevent leakage or disturbance during transport to the processing station.

SAMPLING PROCEDURE USING A SONIC DRILL RIG

Subsurface sediment and native material core samples will be collected by sonic drilling methods at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a). Navigation and boat positioning procedures are described in SOP NC-03 – Navigation and Boat Positioning. Prior to deployment, the following procedures will be used to decontaminate sample tubes:

1. Rinse and pre-clean tubes with potable water.
2. Wash and scrub the Lexan core tubes in a solution of phosphate-free soap (e.g., Alconox) and potable water.
3. Rinse with Study Area water.
4. Seal both ends of each core tube with a decontaminated core cap.

The core cap will be removed immediately prior to placement into the coring device. Care will be taken during sampling to avoid contact of the sample tube with potentially contaminated surfaces.

Subsurface sediment and native material core collection will be performed using the following procedures:

1. The vessel will be maneuvered to the proposed sample location (see SOP NC-03 – Navigation and Boat Positioning).
2. The location will be recorded by the location control personnel, and depth to sediment will be measured with a survey tape attached to a lead line.
3. Safety checks will be made at the beginning of the day, including arranging all winch cables and checking for kinks or burrs, checking the sonic drill rig for fluid leaks, and checking that all "kill" switches are operational.

4. The stabilizers will be lowered, and the sonic drill rig tower will be raised and secured with safety pins and bolts.
5. Before each use, the core barrel will be rinsed using river water and a scrub brush to remove any visible sediment on the interior of the barrel.
6. A decontaminated 5- or 10-foot Lexan core tube liner will be inserted and secured to the sonic drill rig assembly head and deployed from the vessel.
7. The core catcher will be inserted, if needed.
8. The core barrel with drill shoe will be attached to the drill rod, and the cutting head will be attached to the core barrel and lowered down to the approximate sediment surface.
9. The core tube will be sonic-driven into the sediment in 5- or 10-foot sections depending on the sonic drilling rig capacity.
10. The depth of core penetration will be measured and recorded.
11. The core barrel will be raised and there will be sediment adhered to the assembly head; the outside of the core barrel will be sprayed off with site water and then placed on the vessel deck.
12. The cutting bit and core catcher will be removed. The Lexan liner will be slid out of the core barrel using water pressure to force the Lexan liner out, if necessary.
13. Immediately upon recovery of each core section, the ends of the core liners will be capped with aluminum foil sheeting to prevent escape of volatile organic compounds, and subsequently a core tube cap will be added. The cap will be secured with duct tape.
14. The core sample will be evaluated at the visible ends of the core tube; the length of recovered sediment will be recorded; and, if accepted, the core tube will be sectioned into 4- to 6.5-foot lengths to facilitate delivery to the core-processing location.

Acceptance criteria for sediment core samples are as follows:

- Overlying water is present and the surface is intact.
- The core tube appears intact without obstruction or blocking.
- Recovery is greater than 75 percent of drive length.

If sample acceptance criteria are not achieved, the sample is rejected unless modified acceptance criteria are approved by the Field Team Leader and/or multiple attempts have been made at the sampling location.

Anchor QEA personnel will record field conditions and drive notes on the boring logs (see example of Sonic Sediment Core Collection Form in Attachment 2). The logs will include the following information:

- The sample station identification
- Water depth and time of measurement
- Geographic position of the actual coring location as determined by DGPS
- Date and time of collection of each sediment core sample
- Names of field personnel collecting and handling the samples
- Observations made during sample collection, including weather conditions, complications, ship traffic, and other details associated with the sampling effort
- Length of drive penetration and estimated recovery measurements
- Qualitative notation of apparent resistance of sediment column to coring (how the core drove)

Once the core samples are deemed acceptable, the following procedures will be followed:

1. A cap will be placed over the end of the sediment core tube and secured firmly in place with duct tape.
2. The core tube will then be removed from the sampler, and the other end of the core tube will be capped and taped.
3. The core tube will be labeled with the sample station number, segment letter, and an arrow pointing to the top of core.
4. The cores will then be cut into appropriate lengths for transport to the core-processing area for processing.
5. The cores will be sealed tightly enough to prevent leakage or disturbance during transport to the processing station.

SAMPLING PROCEDURE USING A PISTON-CORE/DIRECT-PUSH SAMPLER

Sediment and native material core samples will be collected by a piston-core/direct-push sampler where sample collection by vibracore or sonic drilling methodology is not possible. Navigation and boat positioning procedures are described in SOP NC-03 – Navigation and Boat Positioning. Prior to deployment, the following procedures will be used to decontaminate sample tubes:

1. Rinse and pre-clean tubes with potable water.
2. Wash and scrub the tubes in a solution of phosphate-free soap (e.g., Alconox) and potable water.
3. Rinse with site water.
4. Seal both ends of each core tube with a decontaminated core cap.

The core cap will be removed immediately prior to placement into the coring device. Care will be taken during sampling to avoid contact of the sample tube with potentially disturbed surfaces. Prior to deployment, the cable is passed through the core barrel and attached to a ring on the top of the piston, which is then pushed up into the bottom end of the core barrel. The piston is pushed up into the core barrel so that a space is left at the bottom of the core barrel to accommodate a small layer of water (4 to 6 inches) between the sediment surface and the bottom surface of the piston.

Sediment and native material core collection will be performed using the following procedures:

1. The vessel will be maneuvered to the proposed sample location (see SOP NC-03 – Navigation and Boat Positioning).
2. A decontaminated core tube the length of the desired penetration depth will be assembled, checking to ensure that the core barrel is securely fastened to the piston-core head.
3. The coring device will be placed on the sediment surface at the desired location using extension bars if necessary.
4. The piston line will be secured. With the piston line secured, the piston core will be manually pushed vertically into the sediment. The depth of penetration will be recorded by measuring movement of the piston top in relation to the sediment

surface. The core will be manually pushed into the sediment until refusal or the project depth has been achieved.

5. Excessive hammering to obtain deeper penetration will be avoided. Hammering in the piston core may prevent the manual retrieval of the core due to excessive sediment suction. If very soft sediments are encountered, soft hammering on the top of the core extension poles will be applied.
6. Proper back care will be exercised when pulling a stuck core out of the sediments. Alternatively, an overhead winch will be used to initiate sediment pull-out. The extension bar will be removed as needed as the core is brought to the surface.
7. As the final extension bar is removed, a vertical alignment with the core will be maintained, and a cap will be placed over the bottom of the core as soon as the core nose clears the sediment or water surface to prevent sediment from sliding out the bottom of the core.
8. The piston head will be removed and the core vertically secured for measurements. Any disturbed sediment will be allowed to settle completely within the core tube, and the recovered sediment length will be measured.
9. Water above the sediment will be drained prior to piston removal. First, the water from above the piston will be drained by drilling a hole in the core barrel just above the piston. When the water is drained, another set of holes will be drilled below the piston and just above the sediment surface. After all head water has been drained, the piston will be carefully drawn up and out of the top of the core barrel.
10. The excess plastic tube will be cut off above the sediment surface, and immediately after that, the end will be capped and the caps secured on the top and bottom with duct tape.
11. The appearance and length of the core sample will be evaluated by examination through the clear-plastic core liner. Any stratigraphic intervals or other salient features will be noted on the Sediment Core Collection Log sheet (an example is provided in Attachment 1).
12. The core sample will be evaluated at the visible ends of the core tube; the length of recovered sediment will be recorded; and, if accepted, the core tube will be sectioned into 4- to 6.5-foot lengths to facilitate delivery to the core-processing location.

Acceptance criteria for sediment core samples are as follows:

- Overlying water is present and the surface is intact.
- The core tube appears intact without obstruction or blocking.
- Recovery is greater than 75 percent of drive length.

If sample acceptance criteria are not achieved, the sample will be rejected unless modified acceptance criteria are approved by the Field Team Leader.

Anchor QEA personnel will record field conditions and drive notes on a standard Sediment Core Collection Log (an example is provided in Attachment 1). The logs will include the following information:

1. The sample station identification
2. Water depth and time of measurement
3. Geographic position of the actual coring location as determined by DGPS
4. Date and time of collection of each sediment core sample
5. Names of field personnel collecting and handling the samples
6. Observations made during sample collection, including weather conditions, complications, ship traffic, and other details associated with the sampling effort
7. Length of drive penetration and estimated recovery measurements
8. Qualitative notation of apparent resistance of sediment column to coring (how the core drove)

Once the core samples are deemed acceptable, the following procedures will be followed:

1. A cap will be placed over the end of the tube and secured firmly in place with duct tape.
2. The core tube will then be removed from the sampler and the other end of the core tube will be capped and taped.
3. The core tube will be labeled with the sample station number, segment letter, and an arrow pointing to the top of the core.
4. The cores will then be cut into appropriate lengths for transport to the core-processing area for processing.

5. The core tubes will be sealed tightly enough to prevent leakage or disturbance during transport to the processing station.

QUALITY ASSURANCE/QUALITY CONTROL

Entries in the field forms will be double-checked by the field team staff to verify that the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

LIST OF ATTACHMENTS

Attachment 1 – Sediment Core Collection Log

Attachment 2 – Sonic Sediment Core Collection Form

ATTACHMENTS

Sediment Core Collection Log

Job: Newtown Creek RI

Job No:

Field Staff:

Contractor:

Vertical Datum:

Station ID:

Attempt No.

Date:

Logged By:

Horizontal Datum:

Field Collection Coordinates:

Lat/Northing:

Long/Easting:

A. Water Depth

DTM Depth Sounder:

DTM Lead Line:

B. Lake Level Measurements

Time:

Height:

C. Mudline Elevation

Core Collection Recovery Details:

Core Accepted: Yes / No

Core Tube Length:

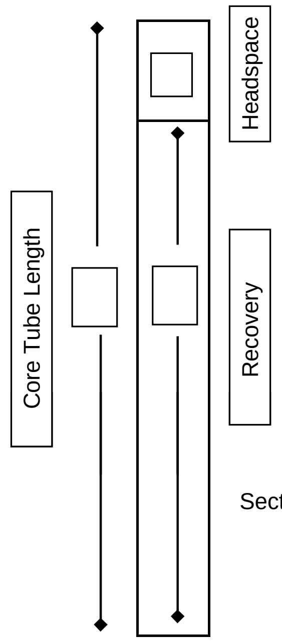
Drive Penetration:

Headspace Measurement:

Recovery Measurement:

Recovery Percentage:

Total Length of Core To Process:



Sections:

Drive Notes:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

Notes:

Sonic Sediment Core Collection Form

Station ID: ____________________ **Date:** ____________________

Project Name: Newtown Creek RI Phase 2 **Project Number:** ____________________

Coordinates (NAD83 NYLI):

Northing: ____________________ Easting: ____________________

Vertical Datum (NAVD88)

Depth Measurement Sounder Leadline

	Section __	**Section __**	**Section __**
Time Start:			
(A) Measured Water Depth		NA	NA
(B) Tide Height		NA	NA
(C) Mudline Elevation		NA	NA
(-A+B = C include sign of tide height as reported)			
Core Tube Length			
(D) Estimated Penetration			
Description of Core Drive			
Refusal Encountered?			
(E) Recovery Length			
% Recovery (E / D)			
Time End:			

Classification and Remarks
(Density, Moisture, Color, Minor Constituent, MAJOR Constituent with Additional Constituents, Sheen, Odor)

Section Cut:

Section Cut:

Section Cut:

Comments:	**Core Sections to process:**
	A _0__ **to** _____ **B** ____ **to** _____ **C** ____ **to** _____ **D** ____ **to** _____ **E** ____ **to** _____

STANDARD OPERATING PROCEDURE NC-20 – SEDIMENT AND NATIVE MATERIAL CORE PROCESSING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the processing of sediment and native material core samples to characterize the chemical nature of subsurface sediments as part of the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Core processing is described in this SOP. Specific information regarding sediment and native materials core processing can be found in the associated *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a) and the *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014b).

Procedures for sediment and native material core processing outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be recorded in the Daily Log and on a Field Deviation Form (see SOP NC-01 – Field Records).

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014c). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* (Anchor QEA 2014d), and the corresponding documents (i.e., Phase 2 FSAP Volume 2, Phase 2 QAPP, and Phase 2 HASP [Anchor QEA 2014a, 2014b, and 2014c, respectively]). All field personnel are required to take a 40-hour Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response training course and annual refresher courses as well as participate in a medical monitoring program prior to engaging in core processing activities. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions.

- Approved documents including the Phase 2 FSAP Volume 2, Phase 2 QAPP, and Phase 2 HASP (Anchor QEA 2014a, 2014b, and 2014c, respectively)
- Appropriate personal protective equipment and clothing as defined in the Phase 2 HASP (Anchor QEA 2014c)
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Decontaminated stainless-steel bowls and spoons
- Physical Description of Subsurface Sediment and Native Material Key (see Attachment 1), Sediment Core Processing Log forms (see example provided in Attachment 2), and Flow Diagram for Field Identification of NAPL (see Attachment 3)
- Tape measure
- Camera
- White board and pens
- Paper towels
- Duct tape
- Aluminum foil
- Core-cutting equipment
- Coolers with ice
- Sample containers and labels
- Clear-plastic, resealable zippered bags (or equivalent)
- Field application
- Air monitoring equipment

CORE PROCESSING PROCEDURES

1. Sediment and native material cores, once collected, will be stored upright to preserve core sediment integrity and kept at 4 degrees Celsius (° C), plus or minus 2° C, until processing.
2. Sediment and native material core processing will be conducted at the processing area after being transported from the collection boat.

3. Core processing consists of removing the sediment and native materials from the core or cutting the core open to access the sediments.
4. All working surfaces and instruments will be thoroughly cleaned, decontaminated, and covered with plastic or aluminum foil to minimize outside contamination between sampling events.
5. Disposable gloves will be discarded after processing at each station and replaced prior to handling decontaminated instruments or work surfaces.
6. Prior to processing, the core caps will be removed, and each section of the core will be cut longitudinally using a circular saw or a cutting tool; care will be taken not to penetrate the sediment while cutting.
7. Two longitudinal cuts will be made along the sides of the core so that the core can be opened to expose the sediment.
8. The sediment core will be split with decontaminated stainless-steel utensils to expose the center of the two halves for sampling.
9. If volatile organic compounds (VOCs) are to be sampled, this material is to be taken immediately upon opening the core, as described in this SOP in separate sections.
10. Prior to sampling, color photographs will be taken of the total core length.
11. A description of the core sample will be recorded on the Sediment Core Processing Log form (see example provided in Attachment 2) for the following parameters as appropriate:
    - Date and time of sample collection
    - Sample recovery (depth in feet of penetration compared to recovery)
    - Physical soil description along the entire length of the core in accordance with ASTM International (ASTM) procedures (ASTM D2488 – Standard Practice for Description and Identification of Soils [Visual-Manual Procedure] and ASTM D2487 – Standard Classification of Soils for Engineering Purposes [Unified Soil Classification System]) will be recorded including soil type, moisture content, density/consistency of soil, color
    - Visual evidence of impacts (e.g., sheens) and performance of shake tests as specified in the Flow Diagram for Field Identification of NAPL (Attachment 3)
    - Odors (e.g., hydrogen sulfide or petroleum)
    - Visual stratification, structure, and texture
    - Vegetation and debris

- Photoionization detector readings
- Biological activity (e.g., detritus, shells, tubes, bioturbation, and live or dead organisms)
- Presence of sheen
- Any other distinguishing characteristics or features

12. Sample material will be removed from the core using decontaminated spoons or spatulas, while taking care not to remove material that has come into contact with the sides of the core tube.
13. Core intervals to be removed for chemical analyses are described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a) and will be determined based on recovered (not compaction-corrected) measurements.
14. Table B9-3 in Phase 2 FSAP Volume 2 provides the sampling stations, sample intervals, and planned analysis for each location; Table B9-4 provides the analyses, volume and container requirements, and laboratory information (Anchor QEA 2014a).

SUBSAMPLING – VOLATILE ORGANIC COMPOUNDS

- To minimize the loss of VOCs, subsamples for VOCs will be collected immediately upon core splitting prior to sample characterization.
- Subsample VOC material will be collected from representative portions along the entire length of each sampling interval in the core and transferred directly into a 2-ounce glass sample jar.
- To reduce potential outside contamination from working surfaces and loss of VOCs to be analyzed, the VOC sample will be taken from a portion of the core that has not been exposed to working surfaces.
- Only pre-cleaned, stainless-steel instruments will be used to collect sample material.
- Each sample container will be filled completely with sediment, allowing minimal headspace. Samples will be stored on ice in the dark at 4° C (plus or minus 2° C).

SAMPLE COMPOSITING PROCEDURES

1. Core samples collected for geochronology analyses only are not homogenized and are placed directly into the sample container.
2. If sediment collected from several cores is to be combined into a single sample, a proportionate volume of each individual core section will be placed into a decontaminated stainless-steel bowl for compositing (composite container) using a stainless-steel spoon. For example, if a composite is made up of two samples, the composite container will receive a 50-percent contribution from each individual sediment sample.
3. The material added to the composite container will be representative of the entire depth interval targeted for each individual sample.
4. As an individual contribution becomes available, its proportionate sediment volume will be added to the composite sample container.
5. When all of the desired material is placed into the compositing container, the material will be homogenized until uniform in color and texture, and then placed into the appropriate sample jars as described in the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a and 2014b, respectively).
6. The final composite volume must consist of sufficient sediment to fill all required sample jars.

QUALITY ASSURANCE/QUALITY CONTROL

Entries in the field forms will be double-checked by the field team staff to verify that the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

Anchor QEA, 2014c. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014d. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

LIST OF ATTACHMENTS

Attachment 1 – Physical Description of Subsurface Sediment and Native Material Key
Attachment 2 – Sediment Core Processing Log
Attachment 3 – Flow Diagram for Field Identification of NAPL

ATTACHMENTS

Physical Description of Subsurface Sediment and Native Material Key

Visual sediment descriptions consist of the following:

Moisture content, density/consistency, color, minor constituent, MAJOR CONSTITUENT/GROUP NAME; structure descriptions (as needed); amount and shape of minor constituents (e.g., organics and anthropogenics); biota; odor; sheen

Recovered and in situ depths

Recovered = measured in the lab, actual sediment depth from core tube

Sediment Description Terminology		
1. Moisture Content		
Dry	Little perceptible moisture (upland only)	
Moist	Probably near-optimum moisture content, no visible water (most sediment)	
Wet	Visible free water, probably above optimum	
2. Density (Core Drive Penetration and Finger Pressure)		
SAND or GRAVEL		
Density	**Visual**	**Notes**
Very loose	Freefall	May occur at the top of a core or grab
Loose	Easy penetration	
Medium dense	Moderate penetration	Typically down core due to compaction or compression
Dense	Hard penetration	Bottom of a core, typical to glacial deposits
Very dense	Refusal	
SILT or CLAY		
Consistency	**Visual**	**Notes**
Very soft	Freefall	Soupy, not cohesive
Soft	Easy penetration	Easily penetrated, just starting to be cohesive
Medium stiff	Moderate penetration	Cohesive, molded by finger pressure
Stiff	Hard penetration	Can indent and mold by stiff finger pressure
Very stiff/hard	Refusal	Modeling clay (rolls to a ball)
3. Color and Shading		
Example Colors	**Shades**	
Black	Light	
Browns (olive, yellow, red)	Dark	
Grays (gray, olive, brown)	Very dark	
Mottling: Streaks or spots of a minor color within the larger color unit		
4. Minor and MAJOR Group Name		
Gravel	Silt	
Sand	Clay	
* MAJOR is written in all CAPITAL LETTERS		
* Description of minor constituent precedes MAJOR constituent, except for trace		
Minor Constituents	**Percent**	
Trace (clay, silt, sand, gravel)*	0 to 5	
Slightly (clayey, silty, sandy, gravelly)	5-15	
Clayey, silty, sandy, gravelly	15 to 30	
Very (clayey, silty, sandy, gravelly)	30 to 50	
GROUP NAME	Greater than 50	
* For trace minor constituents, place after MAJOR constituent		

Sediment Description Terminology	
Descriptors	
Sand and Gravel	Rounding
	Sorting
	Grain color
5. Other Minor Constituents: % by volume (e.g., organics and anthropogenics)*	
Other Minor Constituents*	**Percent**
Trace	0 to 5
Occasional	5 to 10
Moderate	10 to 30
Substantial	30 to 50
*Separate major from other minor constituents with a period	
6. Biota	
Beggiatoa - white/colorless, filamentous proteobacteria	
Marsh grass, shells, worms, etc.	
7. Odor Descriptions (No odor detected unless noted)	
Intensity	**Odor Types**
Trace (faint)	Petroleum-like
Moderate (obvious)	Naphthalene-like
Strong (overwhelming)	H_2S-like (Hydrogen sulfide-like)
	Septic-like
	Solvent-like
	Metallic-like
8. Visual Impacts	
8a. Sheen (No sheen observed unless noted) (Modified from ASTM F2534-06)	
Components of a sheen description: Start and end depths, modifier describing relative sample surface area with sheen, sheen color, description of sheen distribution (e.g., continuous, present as 1/2 inch spots, etc.)	
Silvery	Metallic, silver/gray colored
Rainbow	Multicolored
Dark Rainbow	Multicolored with some dark metallic or brown/black coloring
Dark	Dark metallic or brown/black colored
Sheen Distribution Terminology	
Streaks	Flat, lines of sheen (describe size and number)
Florets	Semi-circular, flat, spots of sheen (described size and number)
Covered	Sheen appears continuous over a portion of the sample surface
Distinguishing hydrocarbon-sheen from biological-sheen: If disturbed, a hydrocarbon-sheen will typically coalesce, where an inorganic sheen will break apart and has a blocky appearance	

Modifiers	
Amount	**Percent**
Trace	Less than 2
Slight	2 to 15
Moderate	15 to 40
Moderate to heavy	40 to 70
Heavy	Greater than 70

Sediment Description Terminology	
8b. Nonaqueous Phase Liquid (NAPL)	
Components of a NAPL description: Start and end depths, color, amount (droplets, covered, soaked); droplet frequency/percent of sample covered or soaked; viscosity	
Note: Observations of sheen or NAPL on the sampling equipment during sampling will be recorded on the sampling log and included in the notes section of the core log.	
Blebs	Observed discrete sphericals of NAPL but for the most part, the sediment matrix was not visibly contaminated or saturated. Typically this is residual product. The estimated size and number of blebs should be reported. NAPL presence will be confirmed with a shake test.
Coated	Sediment grains are coated with NAPL. There is not sufficient NAPL material present to saturate the pore spaces. The degree of coating should be described as light, moderate, or heavy. NAPL presence will be confirmed with a shake test.
Saturated	The entirety of the pore space for a sample is saturated with the NAPL. Care should be taken to ensure that water saturating the pore spaces is not observed when using this term. Depending on viscosity, NAPL-saturated materials may freely drain from a sediment sample. NAPL presence will be confirmed with a shake test.
Relative Viscosity	
High viscosity	Taffy-like
Viscous	No. 6 fuel oil or bunker crude-like (molasses-like)
Low viscosity	No. 2 fuel oil-like
Nonaqueous phase liquid (NAPL): NAPL is generally classified as light NAPL (LNAPL) if the density is less than that of water (i.e., will float on water) and dense NAPL (DNAPL) if the density is greater than that of water (i.e., will sink in water). Use a shake test to identify whether observation NAPL is an LNAPL or DNAPL.	

Sediment Description Terminology	
9. Structure and Other Sediment Descriptions	
Hummocky	Cohesive sediment that can be broken down into smaller lumps
Gummy	Cohesive, pliable sediment with high percentage of clay
Bed	Greater than or equal to 0.5 inch thick
Thin bed	Less than 0.5 inch thick
Pockets	Semi-circular to circular inclusion/deposit
Laminated beds	Thin beds (less than 0.5 inch thick) lying between or alternating within a greater unit
Stratified beds	Beds (greater than 0.5 inch thick) lying between or alternating within a greater unit
Organic matter	Mass of leaves, twigs, wood, etc.
Anthropogenic material	Material originated from industrial activity such as coal fragments, slag, etc.
Aggregates	Industrial waste products
Anthropogenic debris	Debris originated from human activity such as trash, plastic, etc.
Decomposed	Visible sign of decomposition or discoloration
Fresh	No visible sign of decomposition or discoloration
Winnowed	Loss of material that occurred during coring, creating a washed-out void space
Contacts: For Core Processing Only	
@	Compositional change or presence of minor constituent
------------------	Major unit change/non-discrete, gradational contact (dashed line)
————————	Major unit change/visually discrete, abrupt contact (solid line)
-------------	Native major unit change/non-discrete, gradational contact (dash-dot line)
--------------	Native major unit change/visually discrete, abrupt contact (dash-dot-dot line)
---------	Minor unit change (competency, color), not used in final core logs, used in field processing logs (half dashed line)

Notes:

*Classification of sediment on core logs is based on visual field observations, which include density/consistency, grain size, and plasticity estimates, and should not be construed to imply field nor laboratory testing unless presented herein.

Visual-manual classification method American Society for Testing and Materials (ASTM) D-2488 for the description and identification of soils was used as an identification guide.

"Grades to" indicates that all characteristics not called out stay the same as the unit above.

@ symbol indicates one single piece of the material (when not accompanied with a "grades to" or contact)

Chemistry: Cores analyzed for chemistry or select chemistry lists

Geotechnical: Cores analyzed for geotechnical analysis list

Geochronology: Cores analyzed for geochronology list

Station IDs: Multiple cores were taken at each subsurface sediment station to collect adequate volume for analysis. Co-located cores were labeled with sequential letters (A-E) within the station identification (ID) to differentiate each accepted attempt. Cores from each station were chosen for an analysis type (e.g., chemistry, geochronology, and archive) based on collection factors such as penetration, recovery, and observation of native material.

Acronyms/terms used in core logs:

NAD83 NYLI = North American Datum of 1983 New York Long Island

NAPL = nonaqueous phase liquid

Native = Sediment deposited prior to the physical influence of humans on the natural environment

NAVD88 = North American Vertical Datum of 1988

NC = Newtown Creek

OSI = Ocean Survey Incorporated

PID = Photo-ionization detector, measures volatile organic compounds (VOCs)

Recent = Deposits lying above native materials

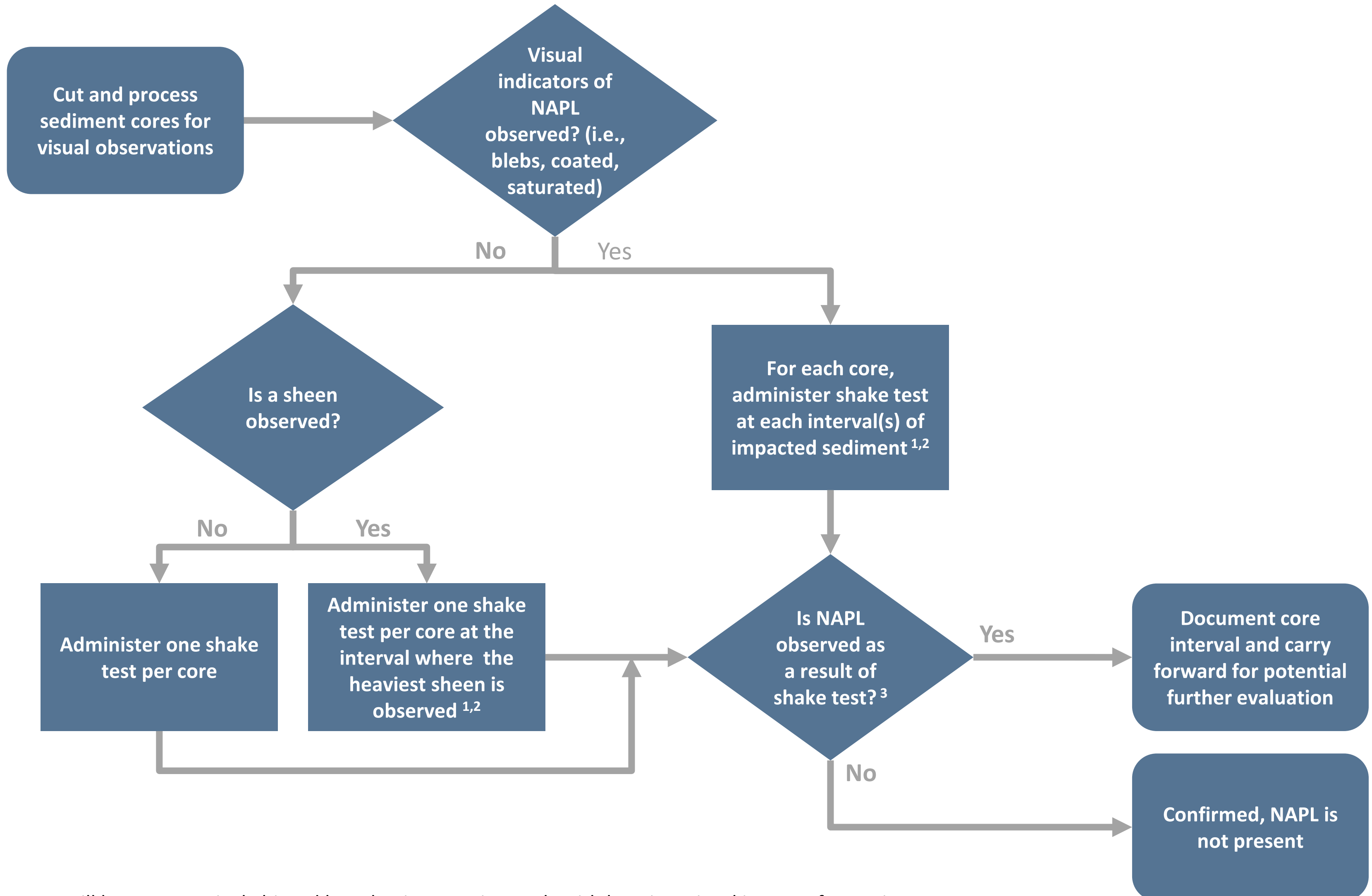
SC = sediment collection

Sediment Core Processing Log

ANCHOR QEA

Job: Newtown Creek RI	Station ID:
Job No.	Date/Time:
No. of Sections:	Core Logged By:
Drive Length:	Attempt #:
Recovery:	Type of Core ☐ Mudmole ☐ Vibracore ☐ Diver Core
% Recovery:	Diameter of Core (inches)
Notes:	Core Quality ☐ Good ☐ Fair ☐ Poor ☐ Disturbed

Recovered Length (cm)	Size % Gravel	Size % Sand	Size % Fines	**Classification and Remarks** (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (cm)	PID	Sample	Summary Sketch



Notes:

1. Shake tests will be conservatively biased by selecting core intervals with heaviest visual impacts for testing.
2. The core will be split vertically. One side will be used in the shake test, and when available, the corresponding interval of the other undisturbed portion will be retained and archived for potential further evaluation.
3. Observation of sheen only is not considered nonaqueous phase liquid (NAPL).

STANDARD OPERATING PROCEDURE
NC-21 – SEDIMENT-WATER SHAKE TEST

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the processing of sediment and native material core samples to characterize the presence or absence of nonaqueous phase liquid (NAPL) in sediment as part of the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. The sediment-water shake test procedure described within this SOP is a field method for screening sediments for the potential presence of NAPL, where sediment and water are added to a clear plastic container, shaken, and the presence of a sheen, possible NAPL blebs, or a potential NAPL layer is observed. Specific information regarding the field screening of sediment samples for potential NAPL can be found in the associated *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a) and the *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014b).

Procedures for sediment-water shake testing outlined in this SOP are intended to support visual observations of potential NAPL during core processing.[1] Deviations from the procedures detailed in this SOP will be recorded in the Daily Log and on a Field Deviation Form (see SOP NC-01 – Field Records).

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014c). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* (Anchor QEA 2014d), and the corresponding documents (i.e., Phase 2 FSAP Volume 2,

[1] An observation of nonaqueous phase liquid (NAPL) via the sediment-water shake test only relates to NAPL presence and is not intended to imply NAPL mobility.

Phase 2 QAPP, and Phase 2 HASP [Anchor QEA 2014a, 2014b, and 2014c, respectively]). All field personnel are required to take a 40-hour Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response training course and annual refresher courses, as well as participate in a medical monitoring program prior to engaging in core processing activities. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions.

- Approved documents, including the Phase 2 FSAP Volume 2, Phase 2 QAPP, and Phase 2 HASP (Anchor QEA 2014a, 2014b, and 2014c, respectively)
- Appropriate personal protective equipment (PPE) and clothing, as defined in the Phase 2 HASP (Anchor QEA 2014c)
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Field logs
- Disposable, 4-ounce, clear-plastic containers with covers
- Light source such as light-emitting diode (LED) flashlight or work lights
- Distilled water (40 degrees Fahrenheit or greater; measure the water temperature at the start and end of the work day and record in the Sediment-Water Shake Test Field Log provided in Attachment 2)
- Tape measure demarcated with centimeters (cm) and millimeters
- Camera
- White board and pens
- Paper towels
- Stainless-steel spoon

SEDIMENT-WATER SHAKE TEST PROCEDURES

1. Cut and process sediment cores for visual observations.
2. As part of conducting visual observations, as described in SOP NC-31 – Groundwater Sample Collection and SOP NC-20 – Sediment and Native Material Core Processing, identify which of the following is present in the core: 1) visual observations of potential NAPL (blebs, coated, or saturated, as defined in Attachment 1 – Physical Description of Subsurface Sediment and Native Material Key); 2) visual observations of sheen (as defined in Attachment 1 – Physical Description of Subsurface Sediment and Native Material Key); or 3) no visual observations of potential NAPL or sheen.
3. If visual observations of potential NAPL or sheen are made (Options 1 or 2 in Step 2), administer a shake test in the interval where the highest level of impact is observed. When the visual observations in one core consist of more than one descriptor (blebs, coated, saturated, and/or sheen), administer one shake test for each descriptor type in the interval where the greatest level of impact for that descriptor type is observed. If no visual observations of potential NAPL or sheen are made (Option 3 in Step 2), conduct one shake test per core, conservatively selecting the shake test sample interval from areas of coarser grain size and/or higher photoionization detector readings. Additionally, conduct one blank per sampling methodology (e.g., vibracore or direct-push coring) using only water to ensure that the shake test container is not biasing results.
4. Perform the shake test as follows:
   - Label the container with the station identification (ID), depth interval, date, and time of shake test, and mark a sediment fill line at 1 cm from the bottom of the jar and a water fill line at 3 cm from the bottom of the jar.
   - Add sediment up to the sediment fill line on the jar.
   - Add distilled water and fill to the water fill line on the jar.
   - Cap the jar and shake gently by inverting the jar repeatedly for 10 seconds to suspend sediment.

- Allow the sample to sit and sediments to settle for a minimum of 10 minutes but no longer than 1 hour[2].

5. Record observations regarding color of the sample and transparency of the sample in the Sediment-Water Shake Test Field Log provided in Attachment 2. Illuminate the shake test container and water surface with a light source (e.g., LED flashlight or work light) when observing the shake test results and record observations of NAPL presence/absence and/or sheen, as detailed in Step 6.
6. Observations following completion of the Sediment-Water Shake Test that are recorded in the Sediment-Water Shake Test Field Log (see Attachment 2) will be determined as follows:

   - If observable NAPL is present in the sample, blebs or a layer of a separate phase material will be apparent on the side of the jar, in the water, or on the surface of the water in the jar. Record in the field log that NAPL is present, and describe the NAPL color, relative amount, and distribution (frequency and size of blebs or thickness of layer) in accordance with Attachment 3, Physical Description of Sediment-Water Shake Test Results Key.
   - If there is **no** observable NAPL, record in the field log no observed NAPL[3].
   - If a sheen is observed (a silvery or rainbow film on the surface of water), record in the field log the sheen color in accordance with Attachment 3, Physical Description of Sediment-Water Shake Test Results Key.

7. Take a color photograph of the shake test container without the lid horizontally and vertically to document the shake test results. Include the station ID, depth interval, date, and time of the shake test in the photograph.
8. If NAPL is observed via the sediment-water shake test and it is possible to archive the opposite portion of the core (i.e., it is not being used for chemistry analysis as part of other Phase 2 field activities), cut a section of the core liner with the sediment intact,

[2] This time range is designed to allow separation to occur so that an observation of nonaqueous phase liquid can be made.

[3] Note that it is possible for non-nonaqueous phase liquid material (e.g., ash, miscellaneous flocculent, or bio-slime) to float on the water surface or adhere to the sidewalls of the shake test container. Such observations will be noted in the Sediment-Water Shake Test Field Log (see Attachment 2).

wrap securely in plastic wrap to preserve intact condition of sediment, and archive and place in a freezer for potential future use.

9. All working surfaces and instruments will be thoroughly cleaned and decontaminated, as outlined in SOP NC-02 – Equipment Decontamination.
10. Disposable PPE and shake test jars will be discarded after processing at each station, as described in SOP NC-08 – Investigation-Derived Waste Handling and Disposal, and replaced prior to conducting shake tests on the subsequent core.

QUALITY ASSURANCE/QUALITY CONTROL

Entries in the field forms will be double-checked by the field team staff to verify that the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

Anchor QEA, 2014c. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014d. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

LIST OF ATTACHMENTS

Attachment 1 Physical Description of Subsurface Sediment and Native Material Key

Attachment 2 Sediment-Water Shake Test Field Log

Attachment 3 Physical Description of Sediment-Water Shake Test Results Key

ATTACHMENTS

Physical Description of Subsurface Sediment and Native Material Key

Visual sediment descriptions consist of the following:

Moisture content, density/consistency, color, minor constituent, MAJOR CONSTITUENT/GROUP NAME; structure descriptions (as needed); amount and shape of minor constituents (e.g., organics and anthropogenics); biota; odor; sheen

Recovered and in situ depths

Recovered = measured in the laboratory, actual sediment depth from core tube

Sediment Description Terminology		
1. Moisture Content		
Dry	Little perceptible moisture (upland only)	
Moist	Probably near-optimum moisture content, no visible water (most sediment)	
Wet	Visible free water, probably above optimum	
2. Density (Core Drive Penetration and Finger Pressure)		
SAND or GRAVEL		
Density	**Visual**	**Notes**
Very loose	Freefall	May occur at the top of a core or grab
Loose	Easy penetration	
Medium dense	Moderate penetration	Typically down core due to compaction or compression
Dense	Hard penetration	Bottom of a core, typical to glacial deposits
Very dense	Refusal	
SILT or CLAY		
Consistency	**Visual**	**Notes**
Very soft	Freefall	Soupy, not cohesive
Soft	Easy penetration	Easily penetrated, just starting to be cohesive
Medium stiff	Moderate penetration	Cohesive, molded by finger pressure
Stiff	Hard penetration	Can indent and mold by stiff finger pressure
Very stiff/hard	Refusal	Modeling clay (rolls to a ball)

3. Color and Shading	
Example Colors	**Shades**
Black	Light
Browns (olive, yellow, red)	Dark
Grays (gray, olive, brown)	Very dark
Mottling: Streaks or spots of a minor color within the larger color unit	
4. Minor and MAJOR Group Name	
Gravel	Silt
Sand	Clay
* MAJOR is written in all CAPITAL LETTERS	
* Description of minor constituent precedes MAJOR constituent, except for trace	
Minor Constituents	**Percent**
Trace (clay, silt, sand, gravel)*	0 to 5
Slightly (clayey, silty, sandy, gravelly)	5 to 15
Clayey, silty, sandy, gravelly	15 to 30
Very (clayey, silty, sandy, gravelly)	30 to 50
GROUP NAME	Greater than 50
* For trace minor constituents, place after MAJOR constituent	

Sediment Description Terminology	
Descriptors	
Sand and Gravel	Rounding
	Sorting
	Grain color
5. Other Minor Constituents: % by volume (e.g., organics and anthropogenics)*	
Other Minor Constituents*	**Percent**
Trace	0 to 5
Occasional	5 to 10
Moderate	10 to 30
Substantial	30 to 50
*Separate major from other minor constituents with a period	
6. Biota	
Beggiatoa – white/colorless, filamentous proteobacteria	
Marsh grass, shells, worms, etc.	
7. Odor Descriptions (No odor detected unless noted)	
Intensity	**Odor Types**
Trace (faint)	Petroleum-like
Moderate (obvious)	Naphthalene-like
Strong (overwhelming)	H_2S-like (Hydrogen sulfide-like)
	Septic-like
	Solvent-like
	Metallic-like
8. Visual Impacts	
8a. Sheen (No sheen observed unless noted) (Modified from ASTM F2534-06)	
Components of a sheen description: Start and end depths, modifier describing relative sample surface area with sheen, sheen color, description of sheen distribution (e.g., continuous, present as 0.5-inch spots, etc.)	
Silvery	Metallic, silver/gray colored
Rainbow	Multicolored
Dark Rainbow	Multicolored with some dark metallic or brown/black coloring
Dark	Dark metallic or brown/black colored
Sheen Distribution Terminology	
Streaks	Flat, lines of sheen (describe size and number)
Florets	Semi-circular, flat, spots of sheen (described size and number)
Covered	Sheen appears continuous over a portion of the sample surface
Distinguishing hydrocarbon-sheen from biological-sheen: If disturbed, a hydrocarbon-sheen will typically coalesce, where an inorganic sheen will break apart and has a blocky appearance	

Modifiers	
Amount	**Percent**
Trace	Less than 2
Slight	2 to 15
Moderate	15 to 40
Moderate to heavy	40 to 70
Heavy	Greater than 70

Sediment Description Terminology	
8b. Nonaqueous Phase Liquid (NAPL)	
Components of a NAPL description: Start and end depths, color, amount (droplets, covered, soaked); droplet frequency/percent of sample covered or soaked; viscosity	
Note: Observations of sheen or NAPL on the sampling equipment during sampling will be recorded on the sampling log and included in the notes section of the core log.	
Blebs	Observed discrete sphericals of NAPL, but for the most part, the sediment matrix was not visibly contaminated or saturated. Typically this is residual product. The estimated size and number of blebs should be reported. NAPL presence will be confirmed with a shake test.
Coated	Sediment grains are coated with NAPL. There is not sufficient NAPL material present to saturate the pore spaces. The degree of coating should be described as light, moderate, or heavy. NAPL presence will be confirmed with a shake test.
Saturated	The entirety of the pore space for a sample is saturated with the NAPL. Care should be taken to ensure that water saturating the pore spaces is not observed when using this term. Depending on viscosity, NAPL-saturated materials may freely drain from a sediment sample. NAPL presence will be confirmed with a shake test.
Relative Viscosity	
High viscosity	Taffy-like
Viscous	No. 6 fuel oil or bunker crude-like (molasses-like)
Low viscosity	No. 2 fuel oil-like
Nonaqueous phase liquid (NAPL): NAPL is generally classified as light NAPL (LNAPL) if the density is less than that of water (i.e., will float on water) and dense NAPL (DNAPL) if the density is greater than that of water (i.e., will sink in water). Use a shake test to identify whether observation NAPL is an LNAPL or DNAPL.	

Sediment Description Terminology	
9. Structure and Other Sediment Descriptions	
Hummocky	Cohesive sediment that can be broken down into smaller lumps
Gummy	Cohesive, pliable sediment with high percentage of clay
Bed	Greater than or equal to 0.5 inch thick
Thin bed	Less than 0.5 inch thick
Pockets	Semi-circular to circular inclusion/deposit
Laminated beds	Thin beds (less than 0.5 inch thick) lying between or alternating within a greater unit
Stratified beds	Beds (greater than 0.5 inch thick) lying between or alternating within a greater unit
Organic matter	Mass of leaves, twigs, wood, etc.
Anthropogenic material	Material originated from industrial activity such as coal fragments, slag, etc.
Aggregates	Industrial waste products
Anthropogenic debris	Debris originated from human activity such as trash, plastic, etc.
Decomposed	Visible sign of decomposition or discoloration
Fresh	No visible sign of decomposition or discoloration
Winnowed	Loss of material that occurred during coring, creating a washed-out void space

Contacts: For Core Processing Only	
@	Compositional change or presence of minor constituent
------------------	Major unit change/non-discrete, gradational contact (dashed line)
————————	Major unit change/visually discrete, abrupt contact (solid line)
-------------	Native major unit change/non-discrete, gradational contact (dash-dot line)
-------------	Native major unit change/visually discrete, abrupt contact (dash-dot-dot line)
---------	Minor unit change (competency, color), not used in final core logs, used in field processing logs (half dashed line)

Notes:

* = Classification of sediment on core logs is based on visual field observations, which include density/consistency, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein.

Visual-manual classification method ASTM International (ASTM) D-2488 for the description and identification of soils was used as an identification guide.

"Grades to" indicates that all characteristics not called out stay the same as the unit above.

@ symbol indicates one single piece of the material (when not accompanied with a "grades to" or contact)

Chemistry: Cores analyzed for chemistry or select chemistry lists

Geotechnical: Cores analyzed for geotechnical analysis list

Geochronology: Cores analyzed for geochronology list

Station IDs: Multiple cores were taken at each subsurface sediment station to collect adequate volume for analysis. Co-located cores were labeled with sequential letters (A-E) within the station identification (ID) to differentiate each accepted attempt. Cores from each station were chosen for an analysis type (e.g., chemistry, geochronology, and archive) based on collection factors such as penetration, recovery, and observation of native material.

Acronyms/terms used in core logs:

NAD83 NYLI = North American Datum of 1983 New York Long Island

NAPL = nonaqueous phase liquid

Native = Sediment deposited prior to the physical influence of humans on the natural environment

NAVD88 = North American Vertical Datum of 1988

NC = Newtown Creek

OSI = Ocean Survey Incorporated

PID = Photoionization detector, measures volatile organic compounds (VOCs)

Recent = Deposits lying above native materials

SC = sediment collection

Sediment-Water Shake Test Field Log

Job: Newtown Creek RI	Station ID:
Job No. 141037-01	
Staff:	Date:
Jar weight:	Jar + sediment weight:
Jar + sediment + water weight:	

Depth Interval/ Time	Color	Transparency	Results (Observed NAPL, No Observed NAPL, Sheen Only) and Description (NAPL/sheen color, relative amount, and distribution)
Notes:			

STANDARD OPERATING PROCEDURE NC-22 – SURFACE SEDIMENT SAMPLING USING IN-CREEK SEDIMENT TRAPS

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of surface sediment samples using in-creek sediment traps.

SUMMARY OF METHOD

The crew will use a differential global positioning system (DGPS) to navigate to the pre-determined sampling locations. The sampling vessel will be secured into place at each target location using spuds or anchors. Sediment traps will be installed using an underwater video system at the locations described in Section 9.3 of the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a). The traps will be lowered gently to the bottom of the river and allowed to rest on an approximately level area. Multiple traps will be deployed to provide data on a spatial and temporal basis. Sediment traps will be deployed for the time periods specified in Section 9.3 of the Phase 2 FSAP Volume 2.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek Remedial Investigation/Feasibility Study (RI/FS).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* (Anchor QEA 2014c), and the corresponding documents (i.e., Phase 2 FSAP Volume 2, Phase 2 HASP, and *Phase 2 Quality Assurance Project Plan*; Anchor QEA 2014a, 2014b, and 2014d, respectively). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

- Sampling vessel equipped with spuds or anchors
- DGPS capable of sub-meter accuracy
- Photoionization detector (PID)
- Calibrated steel rod for probing
- Appropriate personal protective equipment and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Applicable field forms
- Laptop computer and field application program
- Aluminum or plastic tubs
- Sample transfer tools (disposable spoons or equivalent)
- Digital camera
- Decontamination supplies
- Containers for holding investigation-derived wastes from this program
- Lab containers, coolers, and ice
- Basic hand tools
- Underwater video system
- Sediment traps
- Telescoping poles and associated tools for trap deployment and retrieval
- 100-milliliter (mL) graduated cylinder
- 1,000-mL graduated cylinder
- Pre-cleaned, 4-liter, wide-mouth, amber glass containers
- 2-gallon resealable plastic bags

PROCEDURES

Sediment Trap Deployment

Four sediment traps will be installed adjacent to each other at each location shown in Figure B9-3 in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a). One of the traps will be used to provide samples for physical characteristics (the “primary” trap), and the other traps will be used to provide samples for chemical characteristics (the "secondary" traps) for the parameters defined in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a). Deployment of the sediment traps will be performed as follows:

1. Obtain the target coordinates of each sediment trap and program into the DGPS or global positioning system (GPS).
2. Navigate the sampling vessel to within approximately 30 feet of each target location using the GPS. Secure the vessel in position using spuds or anchors.
3. Mark the sediment traps using a unique identification (ID), so each trap can be identified in the future.
4. Measure the water depth using a leadline, and then cut a length of rope that is approximately 5 feet longer than the water depth at high tide. Fasten a small buoy labeled with the sediment trap ID to each sediment trap using the rope. The buoy will float on the surface and will assist in locating the traps during future sampling events.
5. Gently lower a sediment trap to the bottom of the river using a rope or telescoping pole equipped with a hook. Use the underwater video system to confirm that the sediment trap is placed in a stable position on the bottom.
6. Record the date, time, actual GPS coordinates, and sediment trap IDs deployed at each location on the Sediment Trap Deployment and Retrieval Form (provided in Attachment 1) on hard copy or in the Anchor QEA Field Scribe field application program. A sediment trap schematic is provided in Attachment 2.

Sediment Sample Collection

Several rounds of sample collection may be performed, as specified in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a); this procedure will be followed during each sampling event. The primary traps will be sampled more frequently than the secondary traps (e.g., primary traps may be sampled monthly and secondary traps may be sampled quarterly). Care should be taken not to disturb the secondary traps during sampling events that only involve the primary traps. Sampling will be performed as follows:

1. Navigate the sampling vessel to a sediment trap location using GPS and/or visual guidance to the buoy marking the location. Secure the vessel using spuds or anchors.

2. Identify the ID of each trap by checking the surface buoy. If the surface buoy cannot be located, use an underwater video system to locate the sediment trap.
3. Confirm the traps have remained in an undisturbed state. Gently pull up on the rope until resistance is felt. A steady force should be required to bring the trap to the surface. If the trap pulls up easily for the first several inches, then additional force is needed to lift the trap upward, it may indicate that the trap is tipped over. If it is suspected that the trap has tipped over or has been disturbed otherwise, use the underwater video system to inspect the trap.
4. Gently raise the trap to be sampled to the deck of the sampling vessel. If the surface buoy is visible, use the rope attached to the buoy to retrieve the trap. If the buoy is not visible, but the trap was located using the video system, use a telescoping pole equipped with a hook or similar device to lift the trap to the surface.
5. Decant the water that overlies the sediment, which has accumulated in the trap, to the extent possible without losing solids. Pour the remaining water and sediment from the trap into a wide-mouth, 4-liter glass container.
6. Screen the sample with the PID. Readings will be recorded manually or electronically using the Field Scribe field application program or on the Sediment Trap Deployment and Retrieval Form (see Attachment 1).
7. Log sediments in each trap using the Unified Soil Classification System and record on the Sediment Trap Deployment and Retrieval Form (see Attachment 1), including primary grain size, minor constituents, color, consistency, odors, and visible evidence of impacts (e.g., sheen).
8. Make a photographic log of each trap sample. Take a representative photograph with a place card of the sample location, sample interval, and date.
9. For primary traps (physical characteristics analysis), rinse the trap with distilled water, and combine the rinsate with the sample in the 4-liter, wide-mouth glass container. Label the container with the appropriate sediment trap ID.
10. For secondary traps, do not add distilled water to the trap. If a significant amount of sediment is present in the trap after decanting, use a clean spoon to remove it and place it in the 4-liter, wide-mouth glass container. Homogenize and distribute the sediment sample to appropriate laboratory containers.

11. Redeploy the trap (if required) by gently lowering it to the bottom of the creek. If it is suspected that the trap is unstable on the bottom, confirm that it is in a stable position with the underwater video system.

SAMPLE HANDLING AND PRESERVATION

Samples will be collected and placed in containers in accordance with the procedures described previously and as described in SOP NC-07 – Sample Packaging and Shipping. Each container will be placed in a resealable plastic bag and placed in a cooler. The samples will be chilled with ice to approximately 4 degrees Celsius. A temperature blank will be placed in each cooler, for use by the laboratory, to measure the temperature of samples upon submittal. Samples will be transported to the laboratory as soon as practical. Chain-of-custody procedures will be followed, as specified in SOP NC-06 – Sample Custody.

DATA AND RECORDS MANAGEMENT

All data from sample collection will be recorded in the field database using a laptop computer. Upon completion of sampling at one location, all data from the location will be entered into the database. Blank field log sheets can also be used to manually record information when difficulties with data entry using the computer are encountered. Manually recorded data will be transcribed into the Field Scribe field database at the end of each day.

QUALITY ASSURANCE/QUALITY CONTROL

Entries in the field forms will be double-checked by the field team staff to verify that the information is correct. It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

LIST OF ATTACHMENTS

Attachment 1 – Sediment Trap Deployment and Retrieval Form

Attachment 2 – Sediment Trap Schematic

ATTACHMENTS

ANCHOR QEA

Sediment Trap Deployment and Retrieval Form

Job: Newtown Creek RI | Station:

Job No: | Date:

Field Staff:

Contractor: | Proposed Coordinates: Lat.

Long.

Water Height

DTM Depth Sounder: ______________

DTM Lead Line: ______________

Tide Measurements

Time: ______________

Height: ______________

Mudline Elevation (datum): calculated after sampling ______________

Notes: ______________

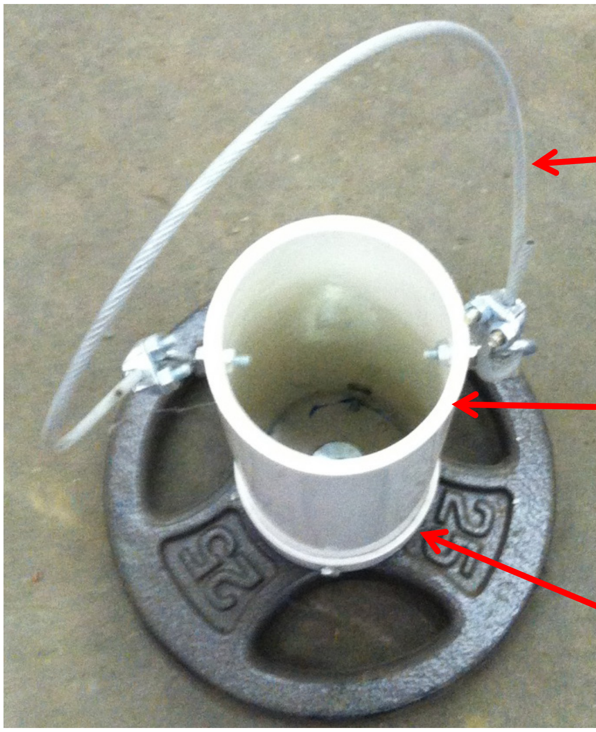
Trap #	Time	Confirmed Coordinates (datum)		Recovery Depth (in)	Approximate Mass (oz)	Comments
		NAD 83 NYLI (N)	NAD 83 NYLI (E)			

Sample Description: surface cover, (density), moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

Sample Containers:

Analyses:

Top View



Cable Lifting Handle

4 in. I.D. PVC x 12 in. high
Sediment collection cup

PVC End Cap
(bolted to base)

Side View

Stable base to maintain trap
in upright position

(Note: base for traps deployed in Newtown Creek will be lighter with a larger surface area to prevent settling into the sediment bed)

STANDARD OPERATING PROCEDURE NC-23 – POINT SOURCES WHOLE-WATER MANUAL COMPOSITE SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources whole-water manual composite samples for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Whole-water samples for laboratory analysis will be collected by pumping the necessary sample volume from municipal or privately owned infrastructure. The appropriate sample collection method for each sampling location is specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for wet-weather, whole-water manual composite sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on sample collection forms and in field notes, as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include review of a sampling location-specific Activity Hazard Analysis (AHA).

In addition to the Phase 2 HASP, the *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties* (NYCDEP HASP; Anchor QEA 2014f) will be read by the sampling staff prior to sampling at locations owned by New York City Department of Environmental Protection (NYCDEP).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced within this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1* (Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1*; Anchor QEA 2014d). As noted above, the NYCDEP HASP will be read prior to sampling at locations owned by NYCDEP, including the Water Pollution Control Plant (Anchor QEA 2014f). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), the location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens and Sharpie fine-point permanent markers (or equivalent)
- Manhole opener
- Flashlights and headlamps
- High-visibility cones
- Multi-parameter water quality meter and manufacturer's operating manual
- Three pre-cleaned 5-gallon buckets

- Graduated cup or pitcher for collection of water quality parameters and pump rate measurement
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch and timer
- Pre-labeled sample containers per the Phase 2 FSAP Volume 2 (Anchor QEA 2014a) and Phase 2 QAPP (Anchor QEA 2014e)
- Plastic resealable bags
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled, 6.5-gallon, glass carboys (see location-specific sampling package for total number of carboys required per sampling location)
- Teflon film for lining carboy lids
- Pre-labeled, laboratory-supplied sample containers for volatile organic compound (VOC) analysis per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014e)
- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- Carboy harnesses
- Carboy coolers
- Power supply (12-volt, deep-cycle battery)
- One or more pumps (ISCO Model 6712 peristaltic pump or similar) with 0.38-inch inner-diameter, silicone pump tubing or other type of pump if specified in the location-specific sampling package

- Sample pickup and distribution tubing: Teflon-lined polyethylene with 0.38-inch inner diameter by 0.5-inch outer diameter
- One or more strainers (one per tubing intake; ISCO stainless-steel or similar) for the tubing intakes
- Pole to affix to sample tubing and strainer(s) (non-NYCDEP locations only; NYCDEP will provide this at its locations)
- Zip ties and clamps to affix the pump tubing and strainer(s) to the pole
- Manhole bracket to which the sampling pole will be attached (non-NYCDEP locations only; NYCDEP will provide this at its locations)
- Manhole safety barricade (non-NYCDEP locations only; NYCDEP will provide this at its locations)
- Tubing support structure, such as a sawhorse or equivalent, to secure tubing when not actively pumping
- Additional equipment or modifications to the equipment listed above identified in the location-specific sampling package, as applicable

SAMPLING PROCEDURES

Water samples will be collected using two-person clean sampling techniques, similar in concept to the U.S. Environmental Protection Agency "clean hands" procedures (USEPA 1996), to minimize contamination. Point sources whole-water manual composite samples will be collected by the following methods at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

A schematic of the equipment setup that will be used for the collection of whole-water samples is presented in Attachment 1. Target sample volumes will vary depending on the sampling location, as described in Table 1. Note that the target whole-water sample volume and the dissolved/particulate volume, when applicable, will each be collected into separate containers. Each carboy or set of carboys will be collected with a time-based compositing method using the procedures described in this SOP.

The results of the first round of sampling will be used to identify locations where dissolved/particulate analyses will be performed during subsequent rounds of sampling. If additional volume is required for dissolved/particulate analyses for subsequent sampling events, that information will be provided in an updated location-specific sampling package.

Table 1
Sampling Volume Requirements[1,2]

Sampling Location Category	Target Whole-Water Sample Volume (liters [number of carboys])	Target Dissolved/Particulate Volume (liters [number of carboys])	Total Target Sample Volume (liters [number of containers])
Category 1	24.6 [1]	None[3]	24.6 [1]
Category 2A and Category 2B	24.6 [1]	None[3]	24.6 [1]
Category 3A, Category 3B, and Category 3C	24.6 [1]	None[3]	24.6 [1]

Notes:
1 = The sample volumes in this table include a factor of safety and/or assumes that each container required will be filled completely. Therefore, the minimum volume required for the analyses listed in Table B10-4 of the *Phase 2 Field Sampling and Analysis Plan – Volume 2* may be less than the volume shown in this table.
2 = The volumes specified in this table will be collected for each storm duration composite sample (i.e., 2-hour, 4-hour, 6-hour, and 8-hour composite samples).
3 = The results of the initial round of sampling will be used to identify target locations for subsequent rounds of sampling where dissolved/particulate analyses will be performed.

During at least one sampling event and up to four events at a subset of the Category 2A manual composite sampling locations, bulk-water samples will be collected along with the whole-water samples using separate equipment setups (e.g., pumps and tubing) to be placed within the manhole concurrently. For these locations during events where bulk-water sampling will also be conducted, the equipment setup shown in the schematic in Attachment 1 in SOP NC-27 – Point Sources Bulk-Water Sampling should be used, rather than the equipment setup shown in the schematic in Attachment 1 of this SOP.

Split samples may be collected for U.S. Environmental Protection Agency, NYCDEP, or individual site owners at the manual composite sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

The following steps will be used prior to mobilizing for an event to develop the pumping time tables that will be used in the field, as discussed further in this SOP:

1. The method lead will review weather predictions to identify storm events that will be suitable for sampling according to the procedures described in SOP NC-29 – Point Sources Weather Tracking.
2. In order to collect a representative sample if the storm event is shorter or longer than anticipated, three of the following storm duration composites will be collected at each location: 2-hour, 4-hour, 6-hour, and 8-hour. Following the decision to mobilize for a storm sampling event, the point sources method lead will determine which three storm duration composites will be collected based on the forecasted storm duration. Because the storm durations for each composite are different, the volume pumped (and therefore, the time spent pumping) during each 15-minute interval will also be different for each storm duration composite. For example, the volume pumped into the 2-hour composite carboys during each 15-minute interval will be twice as much as the volume pumped into the 4-hour composite carboys during each interval because the 2-hour composite carboys need to be filled in half of the time (i.e., 2 hours instead of 4 hours). The volumes and pump times per interval will be determined as follows:
    a. Sample volume will be collected in 15-minute sampling intervals (e.g., a 240-minute storm will have sixteen 15-minute sampling intervals), with the exception of the volume for VOCs as described in the sampling procedures below. Sample collection will initiate at the start of each 15-minute sampling interval and, when possible, will be completed within the first 5 minutes of the interval. Water will be pumped into each container (or set of containers if a composite dissolved/particulate sample is also being collected) during each interval. Because the achievable pump rate is dependent on the pumping lift required and will vary at each sampling location, the pump rate will be measured once the sampling equipment is deployed. In order to determine the time to pump into the sample containers during each 15-minute sample interval for each storm duration composite, the following procedures will be used by the method lead for each of the 2-hour, 4-hour, 6-hour, and 8-hour composites:

i. Divide the storm duration for each composite (in units of minutes) by 15 to determine the potential number of 15-minute sampling intervals for the storm.

ii. Divide the target minimum sample volume for the whole-water sample by the number of 15-minute sampling intervals to determine how much sample volume should be collected into each carboy at each 15-minute sampling interval. The volume of one carboy (24.6 liters) will be used as the target minimum sample volume in the calculation. If additional volume will be collected for dissolved/particulate analyses following the initial sampling event, the same methodology and target minimum sample volume will be used.

iii. Repeat the following calculation for each pump rate from approximately 2.0 to 4.0 liters per minute, in increments of 0.1 liter per minute: Divide each 15-minute sampling interval volume (in liters; calculated in the previous step) by the pump rate in liters per minute. Multiply this number by 60 to calculate the time (in seconds) that water should be pumped into each carboy (including each of the carboys for the dissolved/particulate analyses, if collected). If using an ISCO pump on an automatic setting, the pump will need to be programmed for each sampling location in order to collect the appropriate volume for each 15-minute interval during the composite storm duration.

3. For each storm duration composite (e.g., 2-hour, 4-hour, 6-hour, and 8-hour), tables of pump times for a range of pump rates will be included in the location-specific sampling package. An example pump time table for a single flow rate is included as an attachment to this SOP (Attachment 2).
4. Following measurement of the pump rate as described below, the sampling team will use the table that corresponds to the measured pump rate to determine the pump times per 15-minute sample interval for each of the storm duration composites.

The following steps will be completed prior to initiating sample collection:

1. The field lead will coordinate with the facility owner or representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated by following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.
3. The field facility lead will assemble the necessary pre-labeled sample bottles and verify labels for each sampling location in the field facility.
4. The field sampling team will review this SOP, the applicable location-specific package (including required sampling volumes), and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meets the requirements of this SOP and conforms to any modifications or additions specified in the location-specific sampling package for the sampling location.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific package and any additional direction given by the field team lead.
2. Conduct a tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the site. Air monitoring will be conducted prior to and after opening the sampling manhole, as described in the Phase 2 HASP and NYCDEP HASP, if applicable. Site-specific pre-sampling activities are documented in the location-specific package.
3. Set up required safety equipment specified in the Phase 2 HASP or location-specific package (e.g., high-visibility cones) to cordon off the work area, remove the manhole cover, and set up the manhole safety barricade (non-NYCDEP locations only).

4. Verify that flow is present in the manhole. If there is a tide gate at the sampling location, verify that the gate is open and the outfall is discharging before installing the sampling equipment.
5. Assemble the sampling equipment, including the pump, tubing, pole, and tubing strainers as shown on Attachment 1.

   Between one and three intake tubes set at different depths in the flow will be installed based on pipe dimensions and determined by the method lead. The number of tubes and depth of installation will be specified in each location-specific sampling package. The number and depths of tubing intakes have been determined for most of the NYCDEP sampling locations, and are shown in Attachment 3. As described in this section, the intake depths may be modified after the first event based on improved knowledge of infrastructure or anticipated depth of flow. In general, the number of intake tubes and intake tube heights will be determined in the following manner:

   a. If the discharge depth is estimated to be less than 2 feet, one tubing intake is needed.
      i. Tubing intake is installed 2 inches from the bottom of the pipe or bench, if applicable for locations with regulators. Note that if the flow depth is estimated to be shallower than 4 inches, the intake strainer will be placed to lie on the bottom of the pipe.
   b. If the discharge depth is estimated to be between 2 and 4 feet, two tubing intakes are needed.
      i. Tubing Intake 1 is installed 2 inches from the bottom of the pipe or bench, if applicable for locations with regulators.
      ii. Tubing Intake 2 is installed to 0.5 times the estimated discharge depth (e.g., if discharge depth is 3 feet, Tubing Intake 2 would be installed to 1.5 feet).
   c. If the discharge depth is estimated to be greater than 4 feet, three tubing intakes are needed.
      i. Tubing Intake 1 is installed 2 inches from the bottom of the pipe or bench, if applicable for locations with regulators.
      ii. Tubing Intake 2 is installed to 0.25 times the estimated discharge depth.
      iii. Tubing Intake 3 is installed to 0.75 times the estimated discharge depth.

6. Additional tubing intakes at each height may be required if split samples are to be collected at a given location. If split samples are to be collected during an event, the field lead will provide the field team with the specific split sample collection details prior to the sampling event.
7. Place carboys in coolers or bins with ice during sampling and place the cooler or bin adjacent to the sampling location.
8. Turn on the pump and measure the pumping rate using a graduated container (e.g., 3.8-liter graduated pitcher) and stopwatch. If there are multiple tubing intakes for the sampling location, measure the rate pumping from the lowest tubing intake. Based on the pumping rate, use the appropriate pump rate table showing the pump time per interval per sample container from the location-specific package. It is anticipated that the depth of flow will fluctuate during the sampling event. If the level in the pipe changes significantly (i.e., more than 5 feet), the pump rate should be measured again so that pumping times can be adjusted accordingly.
9. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. Water quality monitoring will occur between sampling intervals.
10. Perform sample collection, as specified in the following steps:

    a. Pump for the time specified in the pumping rate tables into each whole-water sample container for each time-based composite. As noted below in Steps f and g, the lowest tubing intake will be used for the first sample collection interval.
    b. If applicable, pump the specified amount into each of the dissolved/particulate sample containers.
    c. Following each pumping interval, clamp the pump discharge tubing to a tubing support structure (i.e., sawhorse or equivalent) with the end facing downward to keep it from contacting the ground or other surfaces.
    d. Grab samples for VOC analysis will be collected every 2 hours during sampling, beginning 1 hour into sampling. Three volatile organic analysis vials will be filled for each grab sample by pumping at the same rate.

   e. Prior to each sampling interval, purge the tubing by pumping in reverse for approximately 1 minute.
   f. If there is more than one sample intake depth, the sample tubing intake used will rotate between each sampling interval. For the first pumping interval, collect the sample from the lower tubing intake. For the second and third intervals, if applicable, collect the sample from the middle tubing intake and upper tubing intake, respectively. For the following interval, collect the sample from the lower tubing intake.
   g. Continue this process of rotating through the tubing intakes throughout the sampling event. If the water level drops and one or more of the tubing intakes is no longer submerged (as demonstrated by that piece of tubing pumping air and not pumping water during a sample interval), pump from the next piece of tubing in the rotation instead and eliminate the tubing that is no longer submerged from the rotation.

11. As needed to address clogging, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the sampling intake assembly will be removed from the sampling manhole, cleaned of debris, and replaced. This will be accomplished between sample collection intervals. The occurrence of clogging will be recorded on the field form, and sampling will be continued. If clogging is a persistent problem (e.g., more than three occurrences) and prevents the collection of samples representative of the storm event, the field sampling team will contact the point sources field lead to discuss if the sampling of that event or sampling from that tubing intake should be discontinued.
12. Once the final sample aliquot has been collected or there is no longer flow in the pipe, the following steps should be completed:
    a. Pump in reverse to purge liquid from the intake tube(s).
    b. Turn off the pump(s).
    c. Disassemble the pickup and distribution tubing and place in a garbage bag for disposal as investigation-derived waste (IDW).
    d. The field lead will notify the field team as to which whole-water composite (i.e., 2-hour, 4-hour, 6-hour, or 8-hour) should be retained for processing and

analysis. The carboy volume for the other storm duration composites will be poured into the manhole.

e. Load coolers with retained sample containers into the vehicle. For carboys containing sample volumes to be retained for analysis, line the carboy lid with Teflon film.
f. Place equipment, PPE, and any additional items that were brought to the sampling location in the field vehicle, including IDW generated.
g. Pour any other liquid that was collected to measure pump rates or water quality data back into the manhole.

13. Depart from the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Under the supervision of the field facility lead, the field facility team will transfer the whole-water sample volume, if applicable, into laboratory sample containers as specified in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field blanks, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event. Note that for samples collected into carboys, the sample volume for field duplicates will be split into the appropriate laboratory bottles during the field facility homogenizing and filtering process, detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

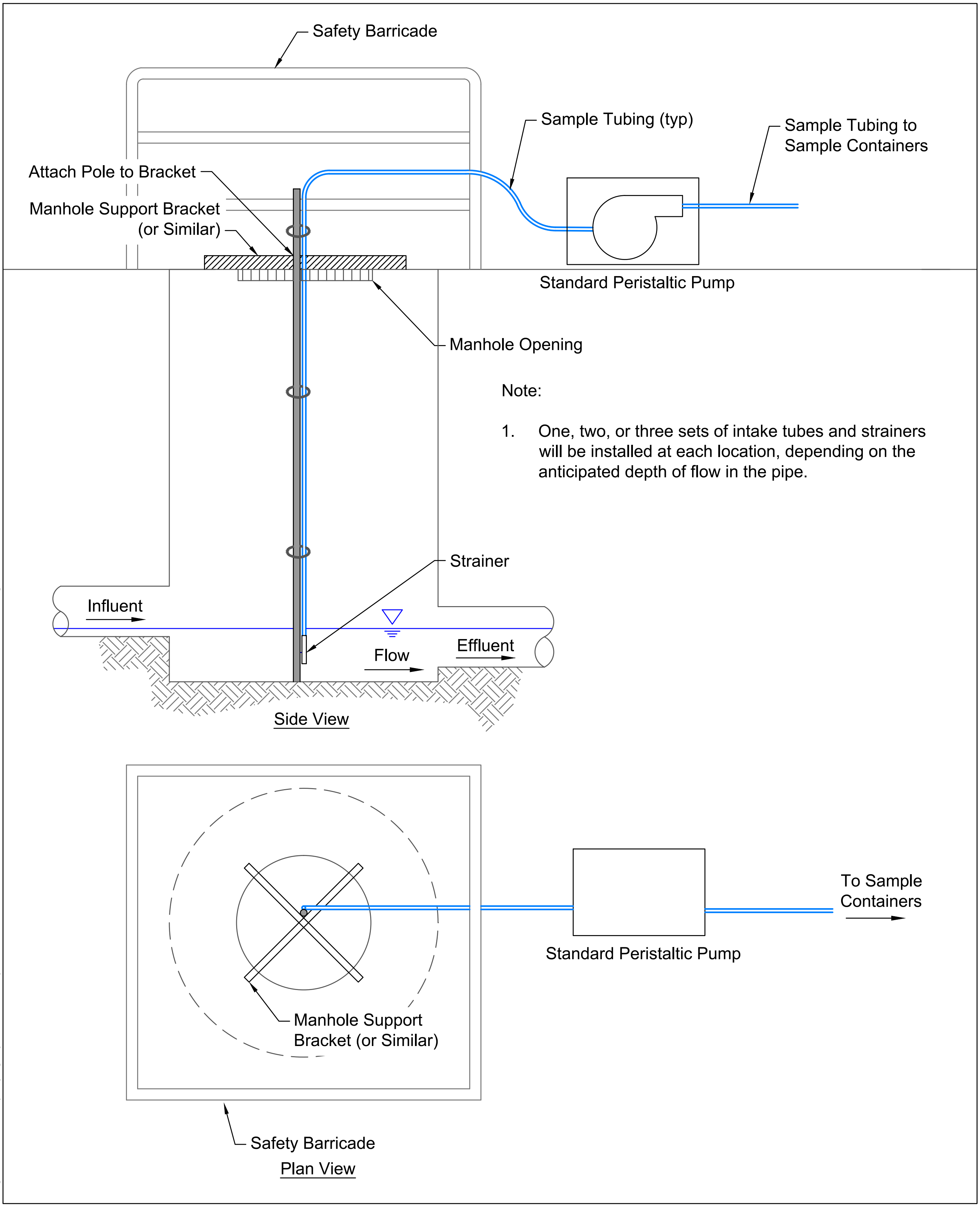
Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

Anchor QEA, 2014f. *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

LIST OF ATTACHMENTS

ATTACHMENTS



Note:

1. One, two, or three sets of intake tubes and strainers will be installed at each location, depending on the anticipated depth of flow in the pipe.

Aug 29, 2014 1:32pm jbigsby K:\Projects\1037-Neal & Harwell PLC\Newtown Creek 2014\1037-RP-003.dwg Attachment 1

ANCHOR QEA

Attachment 1 – SOP NC-23
Schematic of Whole-Water Manual Composite Sample Collection Equipment
Phase 2 FSAP – Volume 2
Newtown Creek RI/FS

Attachment 2
Example Pump Time Table for Whole-Water Manual Composite Sampling

Calculated Pump Rate:		3 liters per minute		
Sampling Program:		Whole-water		
Storm Durations Sampled (hour):		4	6	8
Intervals Sampled:		16	24	32

Carboy fill order	Time pumped into each container during each 15-minute interval (seconds)	Container details
1	16	8-hour storm – whole-water
2	21	6-hour storm – whole-water
3	31	4-hour storm – whole-water

Attachment 3
NYCDEP Sampling Location Intake Tube Heights

Location	Outfall	Station ID	Estimated Depth of Discharge Flow (inches)	Tubing Intake 1 (inches from bottom of pole)	Tubing Intake 2 (inches from bottom of pole)	Tubing Intake 3 (inches from bottom of pole)	Assumes Sampling Pole Bottom is Placed
Long Island City Interceptor System	BB-026	BB026	25.5 (tide gate reportedly does not open completely)	2	12.8	N/A	On bench
Long Island City Interceptor System	BB-009	BB009	38 from bottom of bench (based on size of pipe and tide gate)	2	19	N/A	On bench
Morgan Avenue Interceptor System	NCB-083	NCB083	Sample location pending				
Morgan Avenue Interceptor System	NCB-015	NCB015	60 (tide gate reportedly does not open completely)	2	15	45	Bottom of manhole (no bench)
Morgan Avenue (via secondary interceptor)	NCQ-077	NCQ077	50 (based on height of tide gate)	2	12.5	37.5	On bench
Morgan Avenue (via secondary interceptor)	NCQ-029	NCQ029	Sample location pending				
West Street Interceptor System	NCB-022	NCB022	37.2 from bottom of bench (based on height of tide gate)	16.4	33	N/A	Adjacent to 14.4-inch tall bench. Because of manhole dimensions, the pole cannot be set on the bench.
Newtown Creek WPCP High Flow Relief Discharge	NCB-002	NCB002	N/A	0	N/A	N/A	Intake at bottom of pole, placed at weir.
Newtown Creek WPCP	N/A	N/A	Need additional information from NYCDEP regarding depth of flow and depth to the influent chamber to determine tubing placement and pole length				
Near terminus of English Kills	NCB-629	NCB629	36 (based on size of pipe)	2	18	N/A	Bottom of manhole
East Branch, near Grand Street Bridge, Queens side	NCQ-632	NCQ632	36 (based on size of pipe)	2	18	N/A	Bottom of manhole
Near Calvary Cemetery	NCQ-637	NCQ637	42 (based on size of pipe)	2	21	N/A	Bottom of manhole

STANDARD OPERATING PROCEDURE NC-24 – POINT SOURCES WHOLE-WATER SHEETFLOW MANUAL COMPOSITE SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources whole-water sheetflow manual composite samples from Hugo Neu Schnitzer Category 3C discharge location HN-002 (Station identification [ID] HN002), Meeker Avenue overland flow discharge location (Station ID MA001), and the runoff for the Long Island Expressway discharge location (Station ID LIE001) for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area as noted in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a). Whole-water samples for laboratory analysis will be collected using a peristaltic pump from either a temporary sump or from pooled sheetflow, depending on site conditions.

Procedures for wet–weather whole-water sheetflow manual composite sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on sample collection forms and in field notes, as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include completion of the sampling location-specific Activity Hazard Analysis (AHA).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP;

Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens and Sharpie fine-point permanent markers (or equivalent)
- Flashlights and headlamps
- High-visibility cones
- Multi-parameter water quality meter and manufacturer's operating manual
- Three pre-cleaned 5-gallon buckets
- Graduated cup or pitcher for collection of water quality parameters and pump rate measurement
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch and timer
- Plastic resealable bags
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels

- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled, 6.5-gallon, glass carboys, Teflon film for lining carboy lids
- Pre-labeled, laboratory-supplied sample containers for volatile organic compound (VOC) analysis per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014e)
- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- Carboy harnesses
- Carboy coolers
- Pole to affix to sample tubing and strainer(s) (MA001 only)
- Power supply (12-volt, deep-cycle battery)
- One or more pumps (ISCO Model 6712 peristaltic pump or similar) with 0.38-inch inner-diameter, silicone pump tubing or other type of pump if specified in the location-specific sampling package
- Sample pickup and distribution tubing: Teflon-lined polyethylene with 0.38-inch inner diameter by 0.5-inch outer diameter
- Tubing support structure, such as a sawhorse or equivalent, to secure tubing when not actively pumping
- Temporary location-specific stainless-steel sample collection sump, if needed
- Strainer (ISCO stainless-steel or similar) for the tubing intake
- Additional equipment or modifications to the equipment listed above identified in the location-specific sampling package, as applicable

SAMPLING PROCEDURES

Water samples will be collected using two-person team clean sampling techniques, which is similar in concept to the U.S. Environmental Protection Agency “clean hands” procedures (USEPA 1996) to minimize contamination. Point sources wet-weather whole-water sheetflow manual composite samples will be collected by these methods at the locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

The sample volume to be collected is 24.6 liters, or one full 6.5-gallon glass carboy. This sample volume includes a factor of safety and assumes that the carboy will be filled completely. Therefore, the minimum volume required for the analyses listed in Table B10-4 of the FSAP is less than the targeted volume in this SOP.

The results of the initial round of sampling will be used to identify locations for subsequent rounds of sampling where dissolved and particulate analyses will be performed. If additional volume is required for dissolved and particulate analyses for subsequent sampling events, that information will be provided to the sampling team in an updated location-specific package.

Split samples may be collected for U.S. Environmental Protection Agency, New York City Department of Environmental Protection, or individual site owners at the sheetflow manual composite sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

The following steps will be used prior to mobilizing for an event to develop the pumping time tables that will be used in the field, as discussed further in this SOP:

1. The point sources method lead will review weather predictions to identify storm events that will be suitable for sampling according to the procedures described in SOP NC-29 – Point Sources Weather Tracking and decide to mobilize for sampling of the storm event.
2. In order to collect a representative sample if the storm event is shorter or longer than anticipated, three of the following storm duration composites (one carboy per composite) will be collected at each location: 2-hour, 4-hour, 6-hour, and 8-hour. Following the decision to mobilize for a storm sampling event, the point sources method lead will determine which three storm duration composites will be collected based on the forecasted storm duration. Because the storm durations for each composite are different, the volume pumped (and therefore, the time spent pumping)

during each 15-minute interval will also be different for each storm duration composite. For example, the volume pumped into the 2-hour composite carboys during each interval will be twice as much as the volume pumped into the 4-hour composite carboys during each 15-minute interval because the carboys need to be filled in half of the time (i.e., 2 hours instead of 4 hours). The volumes and pump times per interval will be determined as follows:

a. Sample volume will be collected in 15-minute sampling intervals, with the exception of the volume for VOCs as described in the following sampling procedures. Sample collection will initiate at the start of each 15-minute sampling interval and, when possible, will be completed within the first 5 minutes of the interval. For example, a 240-minute storm will have sixteen 15-minute sampling intervals. Sample collection (i.e., pumping) will occur within the first 5 minutes during each interval. Because the achievable pump rate is dependent on the pumping lift required and will vary at each sampling location, the pump will need to be measured once the sampling equipment is deployed. In order to determine the time to pump into the sample bottle during each 15-minute sample interval for each storm duration composite, the following procedures will be used by the method lead for each of the 2-hour, 4-hour, 6-hour, and 8-hour composites:
    i. Divide the storm duration for each composite by 15 to determine the number of 15-minute sampling intervals for the composites.
    ii. Divide the target minimum sample volume of 24.6 liters by the number of 15-minute sampling intervals. That will produce the target volume per sampling interval (in units of liters per sample interval).
    iii. Repeat the following calculation for each pump rate from approximately 2.0 to 4.0 liters per minute, in increments of 0.1 liter per minute: Divide each 15-minute sampling interval volume (in liters; calculated in the previous step) by the pump rate in liters per minute. Multiply this number by 60 to calculate the time (in seconds) that water should be pumped into each bottle or set of bottles. If using an ISCO pump on an automatic setting, the pump will need to be programmed for each sampling location in order to collect the

appropriate volume during every 15 minutes during the composite storm duration.

3. For each storm duration composite (e.g., 2-hour, 4- hour, 6-hour, and 8-hour), tables of pump times for a range of pump rates will be included in the location-specific sampling package. An example pump time table for a single pump rate is included as an attachment to this SOP (Attachment 1).
4. Following measurement of the pumping rate as described below, the sampling team will use the table that corresponds to the measured pump rate to determine the pump times per 15-minute sample interval for each of the storm duration composites.

The following steps will be completed prior to initiating sample collection:

1. The field lead will coordinate with the facility owner or representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.
3. The field facility lead will assemble the necessary pre-labeled sample bottles and verify labels for each sampling location in the field facility.
4. The field sampling team will review this SOP, the applicable location-specific package (including sampling volumes), and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meets the requirements of this SOP and conforms to any modifications detailed in the location-specific sampling package for the sampling location.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.
2. Conduct a tailgate health and safety meeting and review and initial an AHA form, and conduct additional pre-sampling activities required at the site. Air monitoring will be conducted once the sampling team has arrived at the sampling location, as described in the Phase 2 HASP. Site-specific pre-sampling activities are documented in the location-specific sampling package.
3. Set up required safety equipment specified in the Phase 2 HASP or location-specific package (e.g., high-visibility cones) to cordon off the work area.
4. Place carboys in coolers or bins with ice during sampling for adequate sample preservation, and place the cooler or bin adjacent to the sampling location.
5. Set up sampling equipment at the sampling location (i.e., collection sump [if needed], peristaltic pump, tubing, and strainer). The collection sump, if needed, will be placed in a location that allows the flow to fill the sump (i.e., under the downspout at the Long Island Expressway runoff location). For the Meeker Avenue overland flow location, place the tubing intake and strainer in the pooled sheetflow. The sample intake should be placed at the approximate middle of the water depth in the sump or pooled sheetflow.
6. Turn on the pump and measure the pumping rate using a graduated container (e.g., 3.8-liter graduated pitcher) and stopwatch. Based on the pumping rate, use the appropriate pump rate table showing the pump time per interval per sample container from the location-specific sampling package.
7. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, pump a sufficient amount of sample water from the sump into a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. This may be completed between sampling intervals.
    a. Perform sample collection, as specified in the following steps: During each 15-minute sampling interval, pump for time specified on the appropriate pump rate table (determined following the pump calibration and using the tables provided in the location-specific package, as described previously in this SOP)

into the sample container. Volume should only be pumped from the sump into the carboy when the sump is actively receiving water. The sample intake should be maintained at the approximate middle of the water depth in the sump or pooled sheetflow.

   b. Following each pumping interval, clamp the pump discharge tubing to the tubing support structure (i.e., sawhorse or equivalent) with the tubing end facing downward to keep it from contacting the ground or other surfaces.
   c. Grab samples for VOC analysis will be collected every 2 hours during sampling, beginning 1 hour into sampling. Three volatile organic analysis vials will be filled for each grab sample by pumping at the same rate.

8. Prior to each sampling interval, purge the tubing by pumping in reverse for approximately 30 seconds. Once the final sample aliquot has been collected or there is no longer water flowing into the sump or pooling, pump in reverse to purge the liquid from the tubing, turn off the pump, disassemble sampling equipment, and place pickup and distribution tubing (if applicable) in a garbage bag for disposal as investigation-derived waste. Pour any other liquid that was collected to measure pump rates or water quality data in the same area where the stormwater runoff is or had been flowing (e.g., along the wall or near the downspout).
9. The field lead will notify the field team as to which storm duration composite (i.e., 2-hour, 4-hour, 6-hour, or 8-hour) should be retained for processing and analysis. The carboy volume for the other storm duration composites will be poured into the same area where the stormwater runoff is or had been flowing.
10. Load cooler with retained sample container into the vehicle. For carboys containing sample volumes to be retained for analysis, line the carboy lid with Teflon film. Survey sampling area and collect used PPE and other items. Return sampling equipment to the field vehicle.
11. Depart from the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to

unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.

2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Under the supervision of the field facility lead, the field facility team will transfer the whole-water sample volume into laboratory sample containers as specified in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field blanks, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event. Note that for samples collected into carboys, the sample volume for field duplicates will be split into the appropriate laboratory bottles during the field facility homogenizing and filtering process, detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

LIST OF ATTACHMENTS

Attachment 1 – Example Pump Time Table for Whole-Water Sheetflow Manual Composite Sampling

ATTACHMENTS

Attachment 1

Example Pump Time Table for Whole-Water Sheetflow Manual Composite Sampling

Calculated Pump Rate:		3 liters per minute		
Sampling Program:		Whole-water		
Storm Durations Sampled (hour):		4	6	8
Intervals Sampled:		16	24	32
Carboy fill order	Time pumped into each container during each 15-minute interval (seconds)	Container details		
1	16	8-hour storm – whole-water		
2	21	6-hour storm – whole-water		
3	31	4-hour storm – whole-water		

STANDARD OPERATING PROCEDURE NC-25 – POINT SOURCES WHOLE-WATER GRAB COMPOSITE SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources grab composite samples for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Whole-water samples for chemistry will be collected by pumping or accessing an existing sample port in the water conveyance system at each sampling location. As described in additional detail in this SOP, composite samples will be formed from three grab aliquots collected over the duration of a storm event. The appropriate collection method for each sampling location is specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for grab composite sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on sample collection forms and in field notes as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded in the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the project *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include completion of the sampling location-specific Activity Hazard Analysis (AHA).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens and Sharpie fine-point permanent markers (or equivalent)
- Flashlight and headlamps
- High-visibility cones
- Multi-parameter water quality meter and manufacturer's operating manual
- Three pre-cleaned 5-gallon buckets
- Graduated cup or pitcher for collection of water quality parameters and pump rate measurement
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch and timer
- Plastic resealable bags
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water

- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled, laboratory-supplied sample containers per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014e)
- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- If a pump is needed to collect the samples, the following equipment will be needed:
  - One or more pumps (ISCO Model 6712 peristaltic pump or similar) with 0.38-inch inner-diameter, silicone pump tubing or other type of pump if specified in the location-specific sampling package
  - Power supply (12-volt, deep-cycle battery)
  - Sample pickup and distribution tubing: Teflon-lined polyethylene of 0.38-inch inner diameter by 0.5-inch outer diameter
  - One or more strainers (ISCO stainless-steel or similar) for the tubing intakes
  - Pole to affix to sample tubing and strainer(s)
  - Zip ties and clamps to affix the pump tubing and strainer(s) to the pole and to affix the pole to the top of the sampling access port (if applicable)
  - Tubing support structure, such as a sawhorse or equivalent, to secure tubing when not actively pumping
- 0.45-micrometer (µm) disposable capsule filters
- Additional equipment identified in the location-specific sampling package as applicable

SAMPLING PROCEDURES

Water samples will be collected using two-person team clean sampling techniques, similar in concept to the U.S. Environmental Protection Agency "clean hands" procedures (USEPA 1996), to minimize contamination. Point sources whole-water grab composite samples will be collected using the procedures detailed in the following at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

The results of the initial round of sampling will be used to identify locations for subsequent rounds of sampling where dissolved and particulate analyses will be performed. If additional volume is required for dissolved and particulate analyses for subsequent sampling events, that information will be provided to the sampling team in an updated location-specific package.

Split samples may be collected for U.S. Environmental Protection Agency, New York City Department of Environmental Protection, or individual site owners at the grab composite sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

The following steps will be followed prior to mobilizing for an event:

1. The point sources method lead will review weather predictions to identify storm events that will be suitable for sampling according to the procedures described in SOP NC-29 – Point Sources Weather Tracking. As detailed in the location-specific sampling plans, grab composite sampling will occur during or immediately after a significant rain event when it is anticipated that the majority of the water being discharged is largely stormwater.
2. Following the decision to mobilize for sampling, the point sources method lead and point source field lead will determine the timing of the discharge event and sampling based on the predicted timing of the storm event, the location-specific knowledge of discharge timing and how it relates to the storm event timing, and potentially, discussions with the facility personnel responsible for discharge. Samples will be collected while the outfall is actively discharging, to the extent possible. The point sources field lead will convey this information to the sampling team.
3. The sample volume will be collected into laboratory-supplied containers at three times during the discharge event. Sample collection intervals will be determined by dividing the predicted discharge event duration by three. This will be the sampling interval (in minutes) during the discharge duration. During each interval, one-third of the volume will be collected into each of the sample bottles. The first sample

collection will occur at half of the interval. For example, if the discharge is predicted to occur over a 6-hour period, the sample collection interval would be 2 hours. The first sample aliquot would be collected into the sample bottles at time equals (=) 1 hour, the second aliquot would be collected into the sample bottles at time = 3 hours, and the third (i.e., final) aliquot would be collected into the sample bottles at time = 5 hours. If the discharge is slowing or appears to be stopping sooner than anticipated and before the third aliquot can be collected, the final aliquot should be collected as close to the originally targeted sample time but while the outfall is still discharging, to the extent possible. Sample times will be noted on the sample collection forms.

4. The method lead will provide a table of the collection times for each event to the field lead.
5. The field lead will verify that the collection times are correct and record the information on the field form for use by the field facility lead and field sampling team.

The following steps will be completed prior to initiating sample collection:

1. The field lead will coordinate with the facility owner or representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.
3. The field facility lead will assemble the necessary pre-labeled laboratory sample bottles and verify labels for each sampling location in the field facility.
4. The field sampling team will review this SOP, the applicable location-specific package, and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meets the requirements of this SOP and conforms to any modifications detailed in the location-specific sampling package for the sampling location.

6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.
2. Conduct a tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the site. Air monitoring will be conducted once the team has arrived at the sampling location, as described in the Phase 2 HASP. Site-specific pre-sampling activities are documented in the location-specific package.
3. Set up required safety equipment specified in the Phase 2 HASP or location-specific package (e.g., high-visibility cones) to cordon off the work area.
4. Place sample containers in coolers with ice during sampling and place the cooler adjacent to the sampling location.
5. Set up sampling equipment at the sampling location.
6. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. This may be completed between sampling intervals.
7. The sample volume will be collected directly into the laboratory-supplied containers for each analysis. The volume required for each of the sampling containers will be collected from three sample intervals over the forecasted discharge duration. For the volatile organic compound sample volume, three volatile organic analysis vials will be filled during each of the three sample intervals.
8. For locations where the sample will be pumped from an oil-water separator or sump (e.g., the Motiva Brooklyn Terminal sampling location [Station Identification (ID): MBT001]), affix the pickup tubing to the pole with zip ties, and place the intake near the location and depth of the oil-water separator or sump outlet pipe, if possible. If it is not possible to identify the location of the outlet pipe, place the intake in the center

of the water column to be sampled. At these locations, turn on the pump when it is time to start filling the bottles. During each interval, one-third of the volume will be collected into each of the sample bottles. Fill the bottles in the priority order specified in the location-specific package.

a. Prior to each sampling interval, purge the tubing by pumping in reverse for approximately 1 minute.
b. When not actively pumping, clamp the tubing to the tubing support structure (i.e., sawhorse or equivalent) with the tubing end facing downward to keep it from contacting the ground or other surfaces.

9. For locations where the sample volume will be collected from a sample port, the bottles can be filled directly from the sample port. If tubing is needed, attach the tubing to the sample port before filling the bottles. At these locations, open the sample port valve when it is time to start filling the bottles. During each interval, one-third of the volume will be collected into each of the sample bottles. Fill the bottles in the priority order specified in the location-specific package.

10. Prior to filling the bottles for the dissolved analyses (dissolved metals, dissolved mercury, dissolved phosphorous, dissolved nitrate and nitrite, and dissolved total Kjeldahl nitrogen), a new 0.45-µm capsule filter will be connected to the peristaltic pump tubing. Once the filter is attached, fill one-third of each of the bottles for dissolved analysis. If the filter becomes clogged, dispose of the filter and replace it with a new filter. Repeat this filter attachment for the collection of the dissolved analyses volume during each of the three sampling collection intervals. A new capsule filter should be installed for each sample collection interval.
    a. At locations where the sample volume will be collected from a sample port and tubing and a filter cannot be attached to the sample port, then the required volume for the dissolved analyses will be collected into unpreserved, 1-liter, amber glass bottles. The volume in the bottles will be pumped (using a filter) into the appropriate laboratory bottles at the field facility.

11. Once sampling is complete, place the full containers in plastic bags, place bagged containers back into the cooler, and place cooler in field vehicle. If using a pump to collect samples, pump in reverse to purge liquid from the intake tube once sampling is complete, and turn off the pump. Disassemble sampling equipment and place pickup and distribution tubing (if applicable) in a garbage bag for disposal. Place equipment,

PPE, and any additional items that were brought to the sampling location into the field vehicle, including investigation-derived waste (IDW) generated. Bring any liquid that was collected to measure pump rates or water quality data back to the field facility for disposal as IDW.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Under the supervision of the point sources field facility lead, the samples will be stored and shipped to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field duplicates, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

STANDARD OPERATING PROCEDURE NC-26 – POINT SOURCES WHOLE-WATER DRY-WEATHER GRAB SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources whole-water dry-weather grab samples for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Whole-water dry-weather grab samples for chemistry will be collected by accessing an existing sample port. The appropriate collection method for each sampling location is specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for dry-weather grab sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on the sample collection forms and field notes, as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include completion of the sampling location-specific Activity Hazard Analysis (AHA).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens and Sharpie fine-point permanent markers (or equivalent)
- Flashlight and headlamps (if sampling will occur outside of daylight hours)
- High-visibility cones
- Multi-parameter water quality meter and manufacturer's operating manual
- Three pre-cleaned 5-gallon buckets
- Graduated cup or pitcher for collection of water quality parameters
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch and timer
- Plastic resealable bags
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled, laboratory-supplied sample containers per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014d)
- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- Silicone tubing to connect to sample port
- 0.45-micrometer (μm) disposable capsule filter
- Additional equipment identified in the location-specific sampling package as applicable

SAMPLING PROCEDURES

Water samples will be collected using two-person team clean sampling techniques, similar in concept to the U.S. Environmental Protection Agency "clean hands" procedures (USEPA 1996), to minimize contamination. Point sources whole-water dry-weather grab samples will be collected using the procedures detailed in the following at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

The results of the first round of sampling will be used to identify additional locations where dissolved and particulate analyses will be performed during subsequent rounds of sampling. If additional volume is required for dissolved and particulate analyses for subsequent sampling events, that information will be provided in an updated location-specific sampling package.

Split samples may be collected for the U.S. Environmental Protection Agency, New York City Department of Environmental Protection, or individual site owners at the dry-weather grab sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

The following steps will be completed prior to initiating sample collection:

1. The field lead will coordinate with the facility owner or representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.

2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.
3. The field facility lead will assemble the necessary pre-labeled laboratory sample bottles and verify labels for each sampling location in the field facility.
4. The field sampling team will review this SOP, the applicable location-specific package (including sampling volumes), and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meets the requirements of this SOP and conforms to any modifications detailed in the location-specific sampling package for the sampling location.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.
2. Conduct tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the site. Air monitoring will be conducted once the sampling team has arrived at the sampling location, as described in the Phase 2 HASP. Site-specific pre-sampling activities are documented in the location-specific package.
3. Set up required safety equipment specified in the Phase 2 HASP or location-specific package (e.g., high-visibility cones) to cordon off the work area.
4. Set up sampling equipment at the sampling location. Place sample containers in coolers with ice during sampling and place the cooler adjacent to the sampling location.
5. During the sampling event, immediately before or immediately after collecting samples, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a

multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling.

6. Open the sample port valve and fill the sample containers. Fill the sample containers in the priority order specified in the location-specific sampling package.
7. Prior to filling the bottles for the dissolved analyses (dissolved metals, dissolved mercury, dissolved phosphorous, dissolved nitrate and nitrite, and dissolved total Kjeldahl nitrogen), tubing will be connected to the sampling port, and a new 0.45-µm capsule filter will be connected to the tubing. Once the filter is attached, fill each of the bottles for dissolved analyses. If the filter becomes clogged, dispose of the filter and replace it with a new filter. When all of the bottles for the dissolved analyses are filled, remove the filter and tubing and dispose of them.
    a. If tubing and a filter cannot be attached to the sample port at a location (e.g., the sampling port at the Con Edison - 11th Street Conduit sampling location), then the required volume for the dissolved analyses will be collected into unpreserved, 1-liter, amber glass bottles. The volume in the bottles will be pumped (using a filter) into the appropriate laboratory bottles at the field facility.
8. Place containers in resealable plastic bags, then place bagged containers into a cooler with ice and return it to the field vehicle. Place equipment, PPE, and any additional items that were brought to the sampling location into the field vehicle, including investigation-derived waste (IDW) generated. Bring any liquid that was collected to measure pump rates or water quality data back to the field facility for disposal as IDW.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.

3. Under the supervision of the point sources field facility lead, the samples will be stored and shipped to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and following standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field duplicates, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

STANDARD OPERATING PROCEDURE NC-27 – POINT SOURCES BULK-WATER SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources bulk-water samples for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Bulk-water samples will be collected from combined sewer overflow (CSO) conveyance pipes identified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for bulk-water sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on the sample collection form and in field notes as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be summarized on the Daily Activity Log and recorded on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted at the start of each day of field work and will include completion of the sampling location-specific Activity Hazard Analysis (AHA).

In addition to the Phase 2 HASP, the *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties* (NYCDEP HASP; Anchor QEA 2014f) should be read by the sampling staff prior to sampling at locations owned by New York City Department of Environmental Protection (NYCDEP).

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP

Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). As noted above, the NYCDEP HASP should be read prior to sampling at locations owned by NYCDEP (Anchor QEA 2014f). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Equipment

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Flashlight and headlamps
- High-visibility cones
- Three pre-cleaned 5-gallon buckets
- Graduated cup or pitcher for collection of water quality parameters
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch
- Standardized field log forms (field forms)
- Black ballpoint pens or Sharpie fine-point permanent markers (or equivalent)
- Manhole opener
- Multi-parameter water quality meter and manufacturer's operating manual
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Large plastic bags

- Plastic resealable bags
- Coolers
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Ice

Specific Equipment

- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- Generator compatible with bulk-water pump
- Large-hose, continuous duty, 1.25-inch hose barb peristaltic pump or similar
- Tubing connector hardware
- Sample pick-up and distribution tubing: 1.25-inch inner-diameter Teflon or Teflon-lined tubing with stainless-steel sheathing
- Pump tubing: Silicone tubing of 1.2-inch inner diameter
- One or more strainers (stainless-steel or similar) for the tubing intakes, as needed to minimize the potential for clogging
- Elbow connector for tubing: 1.25-inch diameter polypropylene
- Pole to affix to sample tubing and strainers
- Zip ties and clamps to affix the pump tubing and strainer(s) to the pole
- Manhole bracket to which the sampling pole will be attached (bracket provided by NYCDEP at NYCDEP sampling locations)
- Tubing support structure, such as a sawhorse or equivalent, to secure tubing when not actively pumping
- Three pre-labeled, 6.5-gallon carboys
- Teflon film for lining carboy lids
- Pre-labeled, laboratory-supplied sample containers per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014e)
- Carboy harnesses
- Carboy coolers
- Additional equipment identified in the location-specific sampling package as applicable

SAMPLING PROCEDURES

Water samples will be collected using two-person team clean sampling techniques, similar in concept to the U.S. Environmental Protection Agency "clean hands" procedures (USEPA 1996), to minimize contamination.

The total sample volume to be collected is 75.8 liters (three 6.5-gallon [24.6-liter] carboys and four 500-milliliter laboratory bottles). Of this volume, 73.8 liters (three 6.5-gallon carboys) will be collected for particulate analyses and 2.0 liters will be collected for water analyses. The 73.8 liters and 2.0 liters of volume will be treated as separate samples during the sampling activities.

Split samples may be collected for U.S. Environmental Protection Agency or NYCDEP at the bulk-water sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

Point source bulk-water samples will be collected using the following methods at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

The following steps will be followed prior to mobilizing for an event:

1. The point sources method lead will review weather predictions to identify storm events that will be suitable for CSO sampling according to the procedures described in SOP NC-29 – Point Sources Weather Tracking. The point sources method lead will use the predicted storm duration to determine a volume to be collected per time interval that will allow for sample collection for the entire duration of the storm, while achieving the required sample volume as follows:
   a. Determine predicted storm event duration using the weather tracking procedures outlined in SOP NC-29 – Point Sources Weather Tracking.
   b. Sample volume will be collected during three intervals during the CSO discharge. Divide the predicted storm duration (in units of minutes) by three to determine the time interval between sample collections. The first sample collection will occur at half of the interval. For example, if the CSO discharge is predicted to occur over a 6-hour time period, the sample interval would be

120 minutes. The first sample collection would occur at 60 minutes into the storm, the second would occur at 180 minutes into the storm, and the third (i.e., final) interval would occur at 300 minutes into the storm. If the storm duration is shorter than anticipated, the third sample collection interval time may have to be adjusted. The field lead will inform the sample teams if the sample time will be adjusted.

   c. A constant flow rate will be used for the sample collection. Water will be pumped into one of the carboys in the three-bottle set (73.8 liters) for particulate analysis and each of the four 500-milliliter laboratory bottles for water analyses during each of the three sampling intervals. During each sampling interval, approximately one-third of each of the three carboys for particulate analysis will be filled, and approximately one-third of the laboratory bottles for the water analyses will be filled. The outside of the laboratory bottles for the water analyses will be marked to show how much volume should be pumped into the bottle during each sampling interval (i.e., marked at one-third of the total volume and at two-thirds of the total volume).

2. The geographically neutral NYCDEP point source model results from years 2011 (recent wet year) and 2012 (recent dry year), including storms, total rainfall volume per storm, storm duration, average rainfall intensity, peak flow rate, and plotted hydrographs, may be used as an additional line of evidence in the determination of the sampling event duration.

The following steps will be completed prior to initiating sample collection:

1. The field lead will coordinate with NYCDEP to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated by following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.
3. The field facility lead will assemble the necessary pre-labeled sample bottles and verify labels for each sampling location in the field facility.

4. The field sampling team will review this SOP, the applicable location-specific package, and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meet the requirements of this SOP and the location-specific sampling package.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific packages and any additional direction given by the field lead. Meet with NYCDEP upon arrival.
2. Conduct tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the site. Air monitoring will be conducted prior to and after opening the sampling manhole, as described in the Phase 2 HASP and NYCDEP HASP, if applicable. Site-specific pre-sampling activities are documented in the location-specific package.
3. Set up required safety equipment (e.g., high-visibility cones) to cordon off the work area.
4. Place carboys and bottles in coolers or bins with ice during sampling for adequate sample preservation and place the coolers or bins adjacent to the sampling location.
5. Set up pump close enough to the sampling point access manhole that the tubing will reach, and set up generator in a location that is downwind of the sampling location.
6. Assemble the sampling equipment as shown on Attachment 1. The bulk-water samples will be collected along with the whole-water samples being collected at the same location using separate equipment setups (e.g., pumps and tubing) to be placed in the manhole concurrently, as shown on Attachment 1. The intake for the bulk-water sampling tubing will be installed 2 inches above the bottom of the sampling pole, which will either be placed on the bottom of the pipe or the bench, depending on the sampling location.
7. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity

measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. Water quality monitoring will occur between sampling intervals.

8. Initiate sample collection by pumping water into the three particulate carboys for the bulk-water until the carboys are one-third full. Then pump water into the whole-water laboratory bottles until the bottles are one-third full, as marked on the outside of the bottles. Prior to each subsequent sampling interval, purge the tubing by pumping in reverse for approximately 1 minute. This process will be repeated two additional times until the three particulate carboys and laboratory bottles are full. When not actively pumping, clamp the sample tubing to the tubing support structure (i.e., sawhorse or equivalent) with the end facing downward to keep it from contacting the ground or other surfaces.
9. As needed to address clogging, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing intake, the sampling intake assembly will be removed from the sampling manhole, cleaned of debris, and replaced. This will be accomplished in the time period between sampling intervals. The occurrence of clogging will be recorded on the field form and sampling will be continued. If clogging is a persistent problem (e.g., more than three occurrences) and prevents the collection of samples representative of the storm event, the field sampling team will contact the point sources field lead to discuss if the sampling of that event should be discontinued. A strainer may be used to minimize the potential for clogging.
10. Following the collection of sample volume specified on the field form, complete the following:

    a. Pump in reverse to purge liquid from the intake tube.
    b. Turn off the pump.
    c. Turn off the generator and unplug the bulk-water pump.
    d. Disassemble the pickup and distribution tubing and place in a garbage bag for disposal.
    e. Load coolers with sample containers into the vehicle. Line carboy lids with Teflon film.
    f. Place samples, equipment, PPE, and any additional items that were brought to the sampling location into the field vehicle, including garbage generated.

   g. Pour any other liquid that was collected to measure pump rates or water quality data back into the manhole.

11. Depart from the sampling location in accordance with the location-specific packages and any additional direction given by the field team lead.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Because the bulk-water sample volume cannot be filtered in the field, the volume collected for dissolved metals will be filtered and pumped into the appropriate laboratory container at the field facility.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field blanks, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event. Note that for samples collected into carboys, the sample volume for field duplicates will be split into the appropriate laboratory bottles during the field facility homogenizing and filtering process, detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

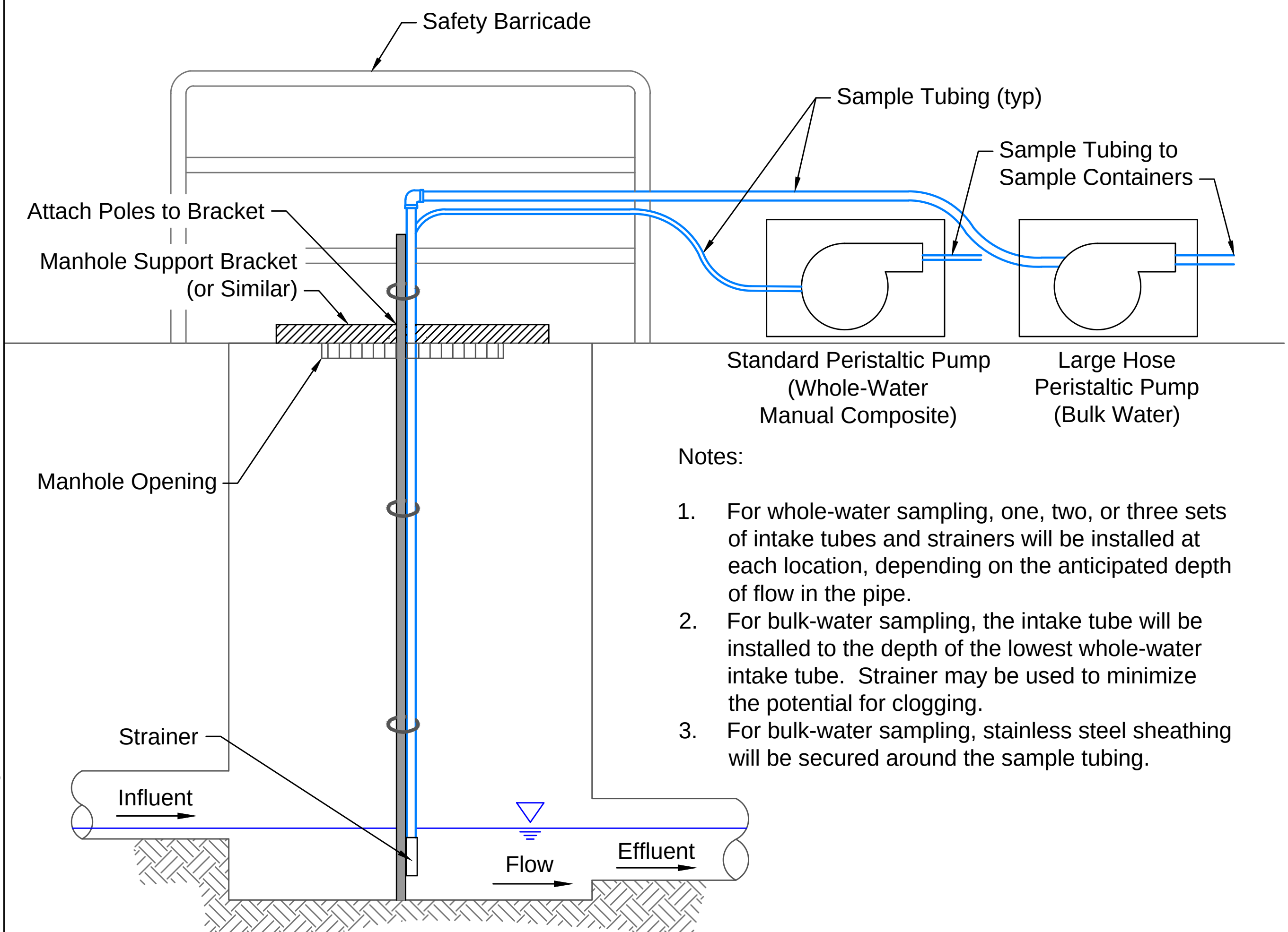
Anchor QEA, 2014f. *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

LIST OF ATTACHMENTS

Attachment 1 – Schematic of Bulk-Water and Whole-Water Manual Composite Sample Collection Equipment

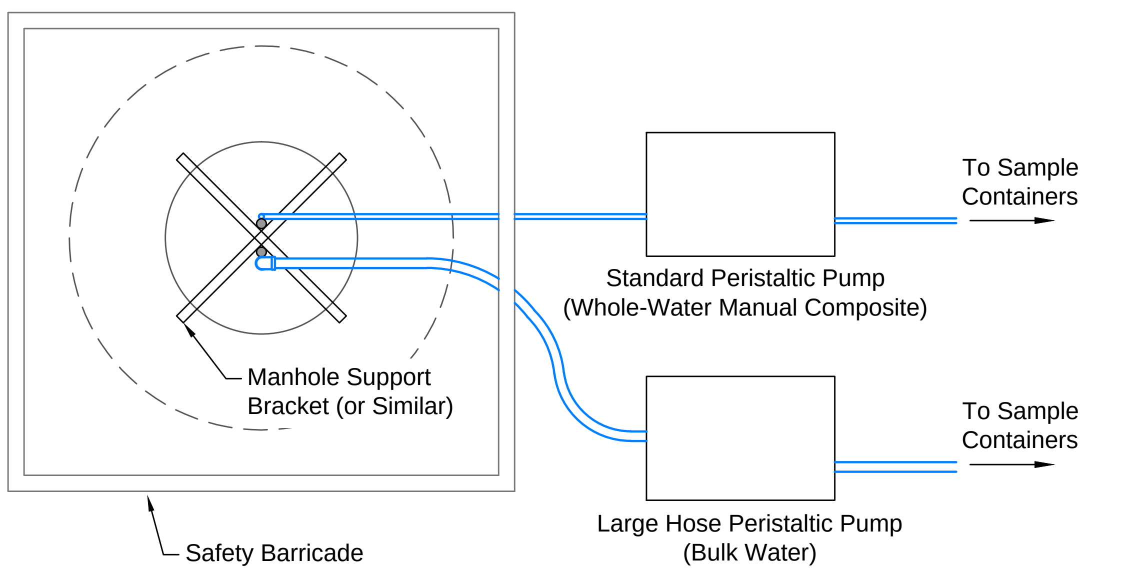
ATTACHMENTS



Side View

Notes:

1. For whole-water sampling, one, two, or three sets of intake tubes and strainers will be installed at each location, depending on the anticipated depth of flow in the pipe.
2. For bulk-water sampling, the intake tube will be installed to the depth of the lowest whole-water intake tube. Strainer may be used to minimize the potential for clogging.
3. For bulk-water sampling, stainless steel sheathing will be secured around the sample tubing.



Plan View

STANDARD OPERATING PROCEDURE NC-28 – POINT SOURCES DISCRETE TOTAL SUSPENDED SOLIDS SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of discrete point sources samples for analysis of total suspended solids (TSS) for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. The TSS samples will generally be collected from the tubing used for collecting the whole-water manual composite samples (see SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling) at the locations identified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for TSS sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on the sample collection form and in field notes as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded in the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include completion of the sampling location-specific Activity Hazard Analysis.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- Approved documents, including the Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Anchor QEA 2014e), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens or Sharpie fine-point permanent markers (or equivalent)
- Flashlight and headlamps
- High-visibility cones
- Plastic resealable bags
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Supplies

- Pre-labeled, laboratory-supplied TSS sample containers per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014e; enough to collect four samples per hour for the entire storm event duration up to 8 hours)
- Additional equipment identified in the location-specific sampling package as applicable

PROCEDURES

Point source discrete TSS samples will be collected from the tubing installed and used for the collection of whole-water manual composite samples (see SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling) being conducted at the same locations as the TSS sampling. Sampling location access, sampling preparation, sampling equipment setup, safety procedures, and installation of sampling tubes will be conducted for the whole-water sampling that is to be conducted at each of the discrete TSS sampling locations. Discrete TSS sampling will be conducted at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

The following procedures describe the collection of discrete samples for TSS analysis, assuming that the equipment has already been installed in accordance with the procedures outlined in SOP-23 – Point Sources Whole-Water Manual Composite Sampling.

The following steps will be completed by the field sampling team at the sampling location:

1. Collect one sample every 15 minutes directly into the laboratory-supplied container, utilizing the pump and tubing used to collect the whole-water sample during that sampling interval. This procedure will be repeated every 15 minutes for the duration of the storm event, cycling between the different intake tubing heights in the same manner as the collection of the whole-water samples is conducted, as applicable.
2. Once full and capped, place containers in plastic bags and place bagged containers in a cooler with ice for transport to the field facility.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field blanks, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA (Anchor QEA, LLC), 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

STANDARD OPERATING PROCEDURE NC-29 – POINT SOURCES WEATHER TRACKING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes weather tracking and mobilization notification procedures for point sources sample collection during Phase 2 of the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Details regarding point sources sample collection are available in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a) and associated SOPs.

Procedures for weather tracking and mobilization outlined in this SOP are expected to be followed. Storm tracking activities and any substantive deviations from the procedures detailed in this SOP will be documented.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* (Phase 2 RI Work Plan Volume 2) Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014d). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for weather tracking and mobilization.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- John F. Kennedy (JFK) airport weather station on-line data
- LaGuardia (LGA) airport weather station on-line data
- Central Park (CPK) airport weather station on-line data
- Site weather station data (at Field Facility and at National Grid)
- National Oceanic and Atmospheric Administration weather forecasts

TRACKING PROCEDURES

Mobilization criteria for stormwater and combined sewer overflow (CSO) sampling events are detailed in Section 5.2.2.1 of the Phase 2 RI Work Plan Volume 2, Section 2.3.1 and 2.3.2 of the *Draft Sources Sampling Approach Memorandum* (Appendix E of the Phase 2 RI Work Plan Volume 2; Anchor QEA 2014e), and summarized in this SOP. Mobilization for wet-weather grab sampling events at Category 1 discharges is dependent on site-specific conditions and will be determined in part through coordination with on-site personnel. Mobilization for sampling New York City (NYC)-owned pipes (i.e., CSO and municipal separate storm sewer system [MS4] locations) and the Newtown Creek Water Pollution Control Plant (WPCP) will be determined in part through coordination with NYC personnel.

Criteria for mobilization to collect stormwater samples (Category 3A, Category 3B, and Category 3C) are the following:

- Storms forecasted to produce more than 0.20 inch of rainfall over a minimum of a 3-hour period
- Storms preceded by at least a 48-hour dry period (less than 0.10 inch of rainfall)

Criteria for mobilization to collect Combined Sewer Discharges, WPCP Treated Effluent (Category 2), and WPCP wet-weather influent samples are as follows:

- Storms forecasted to produce more than the following outfall-specific rainfall thresholds over a minimum of a 3-hour period:
  - BB-026: 0.4 inch
  - BB-009: 0.5 inch
  - NCB-083: 0.1 inch
  - NCB-015: 0.4 inch
  - NCQ-077: 0.3 inch
  - NCQ-029: 0.3 inch
  - NCB-022: 0.4 inch
  - NCB-002: 0.4 inch
  - Wet-weather WPCP influent: 0.1 inch

Storm tracking will be performed on a daily basis (at a minimum) using the following procedures:

- **Step 1**: Using the standard supplies identified in the previous section, determine if rainfall has occurred in the last 48 hours:
  - If yes, antecedent dry period criteria is not met, and no further action is needed.
  - If no, antecedent dry period criteria is met, perform Step 2.
- **Step 2**: Using the standard supplies identified in the previous section, determine if rainfall meeting the criteria for stormwater or CSO sampling is predicted in the next 36 to 72 hours:
  - If yes, rainfall criteria is met, and a notification will be sent:
    - Notifications will be sent at least 48, 24, and 4 to 6 hours prior to a sampling event. Additional notifications may be sent as necessary.
  - If no, rainfall criteria is not met, and no further action is needed

Point sources weather tracking and notification procedures are shown on Attachment 1. Mobilization can be canceled for the following reasons:

- Antecedent dry conditions are not met (i.e., rainfall is greater than 0.1 inch in the previous 48 hours).
- Insufficient predicted rainfall (per criteria presented previously in this section) or duration (less than 3 hours) is predicted.
- A health and safety concern, site access restrictions, or other conditions exist that prevent successful collection of samples.

If mobilization is canceled, email notifications will be sent as soon as possible.

QUALITY ASSURANCE/QUALITY CONTROL

It is the responsibility of the point sources method lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

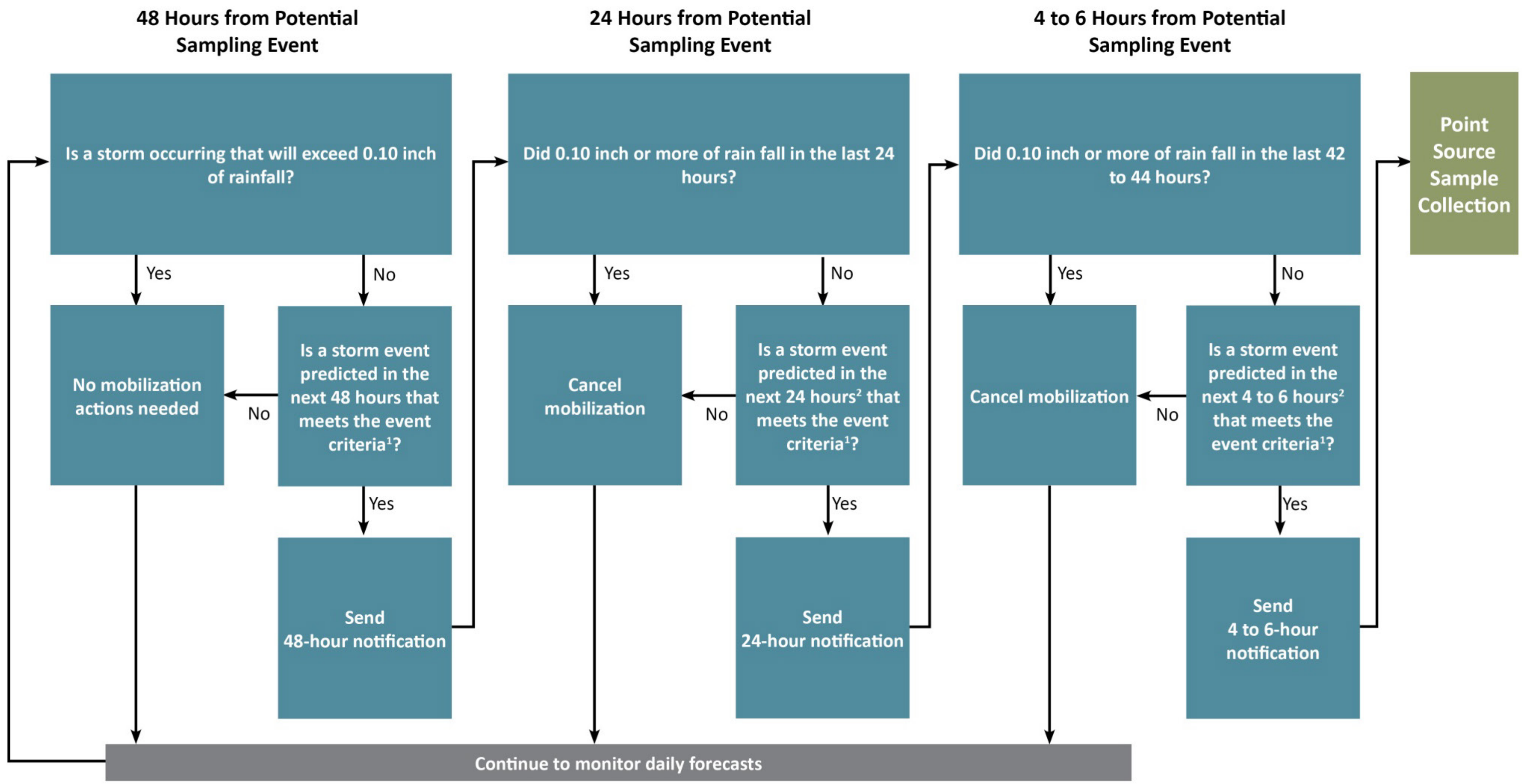
Anchor QEA, 2014d. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

Anchor QEA, 2014e. *Draft Sources Sampling Approach Memorandum*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

LIST OF ATTACHMENTS

Attachment 1 – Point Sources Weather Tracking and Notification Procedures

ATTACHMENTS



Notes:

1 = As noted in SOP NC-29, the storm event criteria is 0.2 inch of rain for stormwater sampling locations and is variable for combined sewer overflows and treated effluent sampling locations. High-tide conditions will be avoided as necessary when possible.

2 = In the event that the predicted time or magnitude of the forecasted storm has shifted, additional notifications may be sent.

STANDARD OPERATING PROCEDURE NC-30 – POINT SOURCES FIELD FACILITY HOMOGENIZING AND FILTERING PROCEDURES

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the procedures for homogenizing and filtering of whole-water samples to be conducted at the Anchor QEA, LLC (Anchor QEA) field facility during the Phase 2 sampling program for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Details regarding sample collection are described in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a) and associated SOPs.

Procedures for homogenizing and field filtering outlined in this SOP are expected to be followed. Homogenizing and field filtering activities will be thoroughly recorded and documented, as specified in SOP NC-01 – Field Records. Any substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records).

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the project *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA personnel as part of the Newtown Creek RI/FS.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014c), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP], Phase 2 HASP, and *Phase 2 Quality Assurance Project Plan* [Phase 2 QAPP]; Anchor QEA 2014a, 2014b, and 2014d, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014e). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample homogenization, filtering, and splitting into laboratory bottles.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions.

Standard Supplies

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling packages, Phase 2 QAPP (Anchor QEA 2014d), and Phase 2 HASP (Anchor QEA 2014b)
- Appropriate personal protective equipment and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Field laptop computer with the field application (including standardized field log forms)
- Black ballpoint pens or Sharpie fine-point permanent markers (or equivalent)
- Chain-of-custody (COC) seals
- COC forms
- Plastic resealable bags
- Packing tape
- Bubble wrap
- Coolers
- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled sample containers per the Phase 2 FSAP Volume 2 (Anchor QEA 2014a) and Phase 2 QAPP (Anchor QEA 2014d)

- Stainless-steel stirring rod
- Stainless-steel spoon
- Paddle mixer
- 0.45-micrometer (µm) disposable capsule filters
- Peristaltic pump (ISCO Model 6712 peristaltic pump or similar)
- New sample tubing: Teflon-lined polyethylene of 0.38-inch inner diameter Pump tubing: Silicone tubing of 0.38-inch inner diameter
- Carboy harnesses

SAMPLE HOMOGENIZING AND FILTERING PROCEDURE

As part of the point sources sampling effort, whole-water samples will be collected into 6.5-gallon glass carboys at the subset of the sampling locations where time-based manual composite sampling will be conducted. If a sample is to be analyzed for whole-water constituents, particulates, and bulk-water, there will be multiple carboys collected at the sampling location. Only the carboys to be analyzed for whole-water constituents will be homogenized and split into the laboratory sampling containers at the field facility. The carboys containing the particulate sample and the three carboys containing the bulk-water sample will be packaged and shipped to the laboratory as is, without processing at the field facility.

Prior to post-sampling processing, an evaluation will be conducted by the point sources field lead to confirm that the samples collected will be representative of the storm event sampled. This includes ensuring that sample collection was conducted during the majority of the storm event runoff duration up to a maximum sampling event duration of 8 hours.

The sampling teams will transport the whole-water samples on ice and in coolers back to the field facility where they will be homogenized, split into laboratory-supplied sample jars, filtered (if necessary), and shipped to the analytical laboratory for analysis. The COC protocol outlined in SOP NC-06 – Sample Custody should be maintained throughout the sample collection, homogenizing, and shipment to the laboratory. The following describe the procedures for homogenizing, filtering, and splitting into sample containers.

1. The analyses for each sample location are listed on Table B10-4 of Phase 2 FSAP Volume 2 (Anchor QEA 2014a). In the event that the sample volume required (also listed in Table B10-4) has not been collected, the priority for analyses of whole-water samples, also listed on the table, should be followed. The total volume of sample and analyses to be conducted will be determined prior to initiation of the homogenizing procedures. The appropriate pre-labeled laboratory sampling containers will be assembled.
2. Once the analyses for the sample have been determined, the sample volume in each whole-water carboy will then be mixed and homogenized, using the stainless-steel rod or spoon to stir the volume, and then using the paddle mixer to keep the volume mixed throughout the splitting and filtering process.
3. The volume will be pumped into the sampling containers and filtered, if needed, as described in the following. As noted in Step 2, the volume will remain mixed and homogenized throughout this process. A peristaltic pump with Teflon-lined polyethylene tubing will be used to pump the water from the carboy into the pre-labeled, laboratory-supplied bottles. Water should be collected directly from the pump outlet tubing into the required sample bottles. The pump intake should be placed in the center of the water volume. The procedures are as follows:

    a. The sample bottles for the analyses should be filled in the order of priority (i.e., highest priority analyses first). The following lists the order in which the bottles should be filled. Note that if field duplicates are to be collected, the duplicate bottle for the laboratory analysis will be filled immediately following the primary bottle for the same laboratory analysis. The priorities listed in the following (e.g., Priority A, Priority B) are shown in Table B10-4 of the FSAP:
        i. Total Priority A bottles
        ii. Dissolved Priority A bottles
        iii. Total Priority B bottles (starting with bottle B1, then B2, and so on)
        iv. Dissolved Priority B bottles (starting with bottle B1, then B2, and so on)

    b. Prior to filling the bottles for the dissolved analyses, a new 0.45-µm capsule filter will be connected to the peristaltic pump tubing. Once the filter is attached, each of the bottles will be filled for dissolved analysis within the priority group (see Step 3a). If the filter becomes clogged, the filter will be disposed of and replaced with a new filter. Once the bottles for the dissolved analyses within the priority group are filled, the filter will be removed from the tubing and disposed of as investigation-derived waste (IDW).

c. The remaining sample bottles will be filled using the peristaltic pump in the order listed in Step 3a.

4. The samples will be packaged and shipped to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.
5. The non-disposable processing equipment (e.g., paddle mixers, stirring rods) will be disassembled and decontaminated per SOP NC-02 – Equipment Decontamination.
6. The disposable processing equipment (e.g., pump tubing, sample tubing, filters) will be disposed of as IDW.
7. The processing station will be reset with clean processing equipment prior to processing the next whole-water sample.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard practices for the homogenization, filtering, and splitting of water quality samples. Homogenizing and filtering forms will be double-checked by the point sources field facility lead to verify the information is correct. It is the responsibility of the point sources field facility lead to periodically check to ensure procedures are in conformance with those stated in this SOP. If sufficient sample volume is available, quality assurance/quality control samples, such as field duplicates and equipment blanks, will be collected at the frequency specified in the Phase 2 QAPP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014d. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

Anchor QEA, 2014e. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. April 2014.

STANDARD OPERATING PROCEDURE
NC-36 – POINT SOURCES
WATER POLLUTION CONTROL PLANT
INFLUENT SAMPLING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources dry-weather and wet-weather, time-based composite samples from the Newtown Creek Water Pollution Control Plant (WPCP) influent for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. Samples for chemistry will be collected by pumping from the influent chamber at the Newtown Creek WPCP. The appropriate collection method for each sampling location is specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for the WPCP influent sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on the sample collection forms and field notes, as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include completion of the sampling location-specific Activity Hazard Analysis (AHA).

In addition to the Phase 2 HASP, the *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties* (NYCDEP HASP; Anchor QEA 2014c) should be read by the sampling staff prior to sampling at locations owned by New York City Department of Environmental Protection (NYCDEP), including the WPCP.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2*

Section 5.2.2 (Anchor QEA 2014d), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced in this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1*, Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1* (Anchor QEA 2014e). As noted above, the NYCDEP HASP should be read prior to sampling at locations owned by NYCDEP, including the WPCP (Anchor QEA 2014c). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that may be necessary to carry out the dry-weather and wet-weather sampling procedures contained in this SOP. Additional equipment may be required depending on field conditions.

- Approved documents, including Phase 2 FSAP Volume 2 (Anchor QEA 2014a), location-specific sampling package, *Phase 2 Quality Assurance Project Plan* (Phase 2 QAPP; Anchor QEA 2014f), Phase 2 HASP (Anchor QEA 2014b), and NYCDEP HASP (Anchor QEA 2014c).
- Appropriate personal protective equipment (PPE) and clothing as defined in the Phase 2 HASP (Anchor QEA 2014b)
- Standardized field log forms (field forms)
- Black ballpoint pens and Sharpie fine-point permanent markers (or equivalent)
- High-visibility cones
- Multi-parameter water quality meter and manufacturer's operating manual
- Three pre-cleaned 5-gallon buckets
- Graduated cup or pitcher for collection of water quality parameters and pump rate measurement
- GasAlertMicro5 photoionization detector gas monitor
- Stopwatch and timer
- Plastic resealable bags
- Packing tape
- Coolers

- Ice
- Decontamination equipment described in SOP NC-02 – Equipment Decontamination
- Paper towels
- Distilled water
- Phosphate-free detergent (e.g., Liquinox)
- Spray bottles
- Large plastic bags

Specific Equipment

- Pre-labeled, 6.5-gallon, glass carboy
- Teflon film for lining the carboy lid
- Pre-labeled, laboratory-supplied sample containers for volatile organic compound (VOC) analysis per the Phase 2 FSAP Volume 2 and Phase 2 QAPP (Anchor QEA 2014a, 2014f)
- Site-specific health and safety documentation required for the sampling location, as detailed in the location-specific sampling package
- Carboy harness
- Carboy cooler
- Power supply (12-volt, deep-cycle battery)
- One or more pumps (ISCO Model 6712 peristaltic pump or equivalent) with 0.38-inch inner-diameter, silicone pump tubing or other type of pump if specified in the location-specific sampling package. Due to the vertical lift needed at this sampling location, an in-line booster pump may also be needed.
- Sample pickup and distribution tubing: Teflon-lined polyethylene with 0.38-inch inner diameter by 0.5-inch outer diameter
- One or more strainers (ISCO stainless-steel or similar) for the tubing intake
- Pole to affix to sample tubing and strainer(s)
- Zip ties and clamps to affix the pump tubing and strainer(s) to the pole
- Tubing support structure, such as a sawhorse or equivalent, to secure tubing when not actively pumping
- Additional equipment or modifications to the equipment listed above identified in the location-specific sampling package, as applicable

DRY- AND WET-WEATHER SAMPLING

Water samples will be collected using the two-person-team clean sampling techniques, similar in concept to the U.S. Environmental Protection Agency (USEPA) "clean hands" procedures (USEPA 1996), to minimize contamination. WPCP influent samples will be collected using the procedures detailed in the following steps at locations described in the Phase 2 FSAP Volume 2 (Anchor QEA 2014a).

Split samples may be collected for USEPA, NYCDEP, or individual site owners at the manual composite sampling locations. The split sampling procedures are described in SOP NC-37 – Point Sources Split Sample Collection and Processing.

The results of the first round of sampling (dry- and wet- weather) will be used to identify additional locations where dissolved and particulate analyses will be performed during subsequent rounds of sampling. If additional volume is required for dissolved and particulate analyses for subsequent sampling events, that information will be provided in an updated location-specific sampling package.

DRY-WEATHER SAMPLING PROCEDURES

The following steps will be followed prior to mobilizing for an event:

1. The method lead will verify that no rainfall is forecasted to occur during the sampling event. The sampling event will consist of the collection of aliquots each hour for 24 hours to collect a dry-weather, time-based composite sample.

The following steps will be completed prior to sample collection:

1. The field lead will coordinate with the Newtown Creek WPCP representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.

3. The field facility lead will assemble the necessary pre-labeled sample bottles and verify labels for each sampling location in the field facility.
4. The field sampling team will review this SOP, the applicable location-specific package (including sampling volumes), and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meet the requirements of this SOP and the location-specific sampling package.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific package and any additional direction given by the field team lead. Samples will be collected from the upper level above the WPCP influent chamber by lowering a pole and tubing into the influent chamber.
2. Conduct a tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the site and documented in the location-specific package. Air monitoring will be conducted once the sampling team has arrived at the sampling location as described in the NYCDEP HASP.
3. Set up required safety equipment (e.g., high-visibility cones) to cordon off the work area.
4. Assemble the sampling equipment, including the pump, tubing, pole, and tubing strainer. The tubing and strainer should be zip-tied and clamped to the pole. The tubing intake will be installed in the approximate middle of the flow depth. The sample intake height may be refined after the first sampling event based on infrastructure or flow information.
5. Place carboy in coolers or bins with ice during sampling for adequate sample preservation and place the coolers or bins adjacent to the sampling location.
6. Turn on the pump and measure pumping rate using a graduated container (e.g., 3.8-liter graduated pitcher) and stopwatch. Based on the pumping rate, the ISCO will

be programmed to pump for the appropriate time during each hourly sampling interval, so that the 6.5-gallon (24.6-liter) carboy is full after 24 hours.

7. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. Water quality monitoring will occur between sampling intervals.
8. Initiate sample collection by starting the ISCO sampling collection program to collect the target volume into the sample carboy every hour during the 24-hour sampling event. The ISCO pump will automatically purge the sample tubing at the end of each interval.
9. Grab samples for VOC analysis will be collected once at the beginning of sampling and once near the end of sampling. Three volatile organic analysis vials will be filled for each grab sample by pumping at the same rate.
10. As needed to address clogging, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the sampling intake assembly will be removed from the influent chamber, cleaned of debris, and replaced. This will be accomplished between sampling intervals. The occurrence of clogging will be recorded on the field form, and sampling will be continued. If clogging is a persistent problem (e.g., more than three occurrences) and prevents the collection of samples representative of the sampling event, the field sampling team will contact the point sources field lead to discuss if the sampling of that event should be discontinued.
11. Following the sample collection at the end of the 24-hour sampling event, the following steps should be completed:
    a. If the tubing is not already purged, pump in reverse to purge liquid from the intake tube.
    b. Turn off the pump.
    c. Disassemble the pickup and distribution tubing and place in a garbage bag for disposal.
    d. Line the carboy lid with Teflon liner and load the carboy cooler into the vehicle.

  e. Place equipment, PPE, and any additional items that were brought to the sampling location in the field vehicle, including garbage generated.
  f. Use the ISCO pump in reverse to pump any liquid that was collected to measure pump rates or water quality data back into the influent chamber, if permitted. If not permitted to do so, bring the liquid back to the field facility for disposal as investigation-derived waste (IDW).

12. Depart from the sampling location in accordance with the location-specific package and any additional direction given by the field team lead.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Under the supervision of the field facility lead, the field facility team will transfer the whole-water sample volume, if applicable, into laboratory sample containers as specified in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.
4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

WET-WEATHER SAMPLING PROCEDURES

The following steps will be used prior to mobilizing for an event to develop the pumping time tables that will be used in the field, as discussed further in this SOP:

1. The method lead will review weather predictions to identify storm events that will be suitable for sampling according to the procedures described in SOP NC-29 – Point Sources Weather Tracking.

2. Following the decision to mobilize for sampling, the point sources method lead and point sources field lead will determine the timing of the discharge event and sampling based on the predicted timing of the storm event and information from WPCP staff or NYCDEP personnel regarding the timing between the start of the storm event and when the flow reaches the WPCP influent chamber. The point sources field lead will convey this information to the sampling team.
3. In order to collect a representative sample if the storm event is shorter or longer than anticipated, three of the following storm duration composites will be collected at each location: 2-hour, 4-hour, 6-hour, and 8-hour. Following the decision to mobilize for a storm sampling event, the point sources method lead will determine which three storm duration composites will be collected based on the forecasted storm duration. Because the storm durations for each composite are different, the volume pumped (and therefore, the time spent pumping) during each 15-minute interval will also be different for each storm duration composite. For example, the volume pumped into the 2-hour composite carboys during each 15-minute interval will be twice as much as the volume pumped into the 4-hour composite carboys during each interval because the 2-hour composite carboys need to be filled in half of the time (i.e., 2 hours instead of 4 hours). The volumes and pump times per interval will be determined as follows:
    a. Sample volume will be collected in 15-minute sampling intervals (e.g., a 240-minute storm will have sixteen 15-minute sampling intervals), with the exception of the volume for VOCs as described in the sampling procedures below. Sample collection will initiate at the start of each 15-minute sampling interval and, when possible, will be completed within the first 5 minutes of the interval. Water will be pumped into each container during each interval. Because the achievable pump rate is dependent on the pumping lift required and will vary at each sampling location, the pump rate will be measured once the sampling equipment is deployed. In order to determine the time to pump into the sample containers during each 15-minute sample interval for each storm duration composite, the following procedures will be used by the method lead for each of the 2-hour, 4-hour, 6-hour, and 8-hour composites:

i. Divide the storm duration for each composite (in units of minutes) by 15 to determine the potential number of 15-minute sampling intervals for the storm.
ii. Divide the target minimum sample volume for the whole-water sample (24.6-liters) by the number of 15-minute sampling intervals to determine how much sample volume should be collected into each bottle at each 15-minute sampling interval.
iii. Repeat the following calculation for each pump rate from approximately 2.0 to 4.0 liters per minute, in increments of 0.1 liter per minute: Divide each 15-minute sampling interval volume (in liters; calculated in the previous step) by the pump rate in liters per minute. Multiply this number by 60 to calculate the time (in seconds) that water should be pumped into each bottle or set of bottles. If using an ISCO pump on an automatic setting, the pump will need to be programmed for each sampling location in order to collect the appropriate volume for each 15-minute interval during the composite storm duration.

4. For each storm duration composite (e.g., 2-hour, 4- hour, 6-hour, and 8-hour), tables of pump times for a range of pump rates will be included in the location-specific sampling package. An example pump time table for a single pump rate is included as an attachment to this SOP (Attachment 1).
5. Following measurement of the pump rate as described below, the sampling team will use the table that corresponds to the measured pump rate to determine the pump times per 15-minute sample interval for each of the storm duration composites.

The following steps will be completed prior to sample collection:

1. The field lead will coordinate with the WPCP representative to access the sampling location in accordance with the notification schedule in SOP NC-29 – Point Sources Weather Tracking.
2. The field lead will verify that the sampling equipment is clean and in working order. Prior to use in the field, the multi-parameter water quality meter will be calibrated by following procedures outlined in SOP NC-09 – Water Quality Monitoring and Profiling.

3. The field facility lead will assemble the necessary pre-labeled sample bottles and verify labels for each sampling location in the field facility.
4. The sampling team will review this SOP, the applicable location-specific package (including required sampling volumes), and other applicable SOPs, including SOP NC-01 – Field Records, SOP NC-02 – Equipment Decontamination, and SOP NC-06 – Sample Custody.
5. The field sampling team will verify that the equipment prepared by the field lead and field facility lead meets the requirements of this SOP and conforms to any modifications or additions specified in the location-specific sampling package for the sampling location.
6. The field sampling team will pack equipment into the field vehicle and transport sampling equipment, sample bottles, and coolers to the sampling location.

The following steps will be completed by the field sampling team at the sampling location:

1. Access the sampling location in accordance with the location-specific package and any additional direction given by the field team lead. Samples will be collected from the upper level above the WPCP influent chamber by lowering a pole and tubing into the influent chamber.
2. Conduct a tailgate health and safety meeting, review and initial the AHA form, and conduct additional pre-sampling activities required at the WPCP and documented in the location-specific package. Air monitoring will be conducted once the sampling team has arrived at the sampling location as described in the NYCDEP HASP.
3. Set up required safety equipment (e.g., high-visibility cones) to cordon off the work area.
4. Assemble the sampling equipment, including the pump, tubing, pole, and tubing strainers. The tubing intake will be installed in the approximate middle of the flow depth of the influent chamber. The sample intake height may be refined after the first sampling event based on infrastructure or flow information.
5. Place carboys in coolers or bins with ice during sampling for adequate sample preservation and place adjacent to the sampling location.
6. Turn on the pump and measure the pumping rate using a graduated container (e.g., 3.8-liter graduated pitcher) and stopwatch. Based on the pumping rate, use the appropriate pump rate table showing the pump time per interval per sample container

from the location-specific package. It is anticipated that the depth of flow will fluctuate during the sampling event. If the level in the chamber changes significantly (i.e., more than 5 feet), the pump rate should be measured again so that pumping times can be adjusted accordingly.

7. At least twice during the sampling event, preferably once at the beginning and once at the end of the event, collect a sufficient amount of sample water in a cup and collect temperature, conductivity, dissolved oxygen, pH, and turbidity and salinity measurements using a multi-parameter water quality meter. Refer to the procedures described in SOP NC-09 – Water Quality Monitoring and Profiling. Water quality monitoring will occur between sampling intervals.
8. Perform sample collection, as specified in the following steps:
    a. Pump for the time specified in the pumping rate tables into each whole-water sample container for each time-based composite.
    b. Following each pumping interval, clamp the pump discharge tubing to a tubing support structure (i.e., sawhorse or equivalent) with the end facing downward to keep it from contacting the ground or other surfaces.
    c. Grab samples for VOC analysis will be collected every 2 hours during sampling, beginning 1 hour into sampling. Three volatile organic analysis vials will be filled for each grab sample by pumping at the same rate.
    d. Prior to each sampling interval, purge the tubing by pumping in reverse for approximately 1 minute
9. As needed to address clogging, the pump will be operated in reverse to clear the obstruction. If pumping in reverse does not effectively unclog the tubing, the sampling intake assembly will be removed from the influent chamber, cleaned of debris, and replaced. This will be accomplished between sampling intervals. The occurrence of clogging will be recorded on the field form, and sampling will be continued. If clogging is a persistent problem (e.g., more than three occurrences) and prevents the collection of samples representative of the storm event, the field sampling team will contact the point sources field lead to discuss if the sampling of that event should be discontinued.
10. Once the final sample aliquot has been collected or there is no longer flow in the chamber, the following steps should be completed:

   a. Pump in reverse to purge liquid from the intake tube.
   b. Turn off the pump.
   c. Disassemble the pickup and distribution tubing and place in a garbage bag for disposal as IDW.
   d. The field lead will notify the field team as to which whole-water composite (i.e., 2-hour, 4-hour, 6-hour, or 8-hour) should be retained for processing and analysis. Using the ISCO pump in reverse, pump the carboy volume for the other storm duration composites back into the influent chamber.
   e. Load coolers with retained sample containers into the vehicle. For carboys containing sample volumes to be retained for analysis, line the carboy lid with Teflon film.
   f. Place equipment, PPE, and any additional items that were brought to the sampling location into the field vehicle, including IDW generated.
   g. Use the ISCO pump in reverse to pump any liquid that was collected to measure pump rates or water quality data back into the influent chamber, if permitted. If not permitted to do so, bring the liquid back to the field facility for disposal as IDW.

11. Depart from the WPCP in accordance with the location-specific package and any additional direction given by the field lead.

The following steps will be completed following sample collection:

1. The field sampling team will give the completed sampling forms (which will include any modifications to the procedures in this SOP implemented in response to unforeseen field conditions) for the event to the field lead who will review the field forms and enter the data electronically into the field application program.
2. The field sampling team will decontaminate sampling equipment for the next sampling event per SOP NC-02 – Equipment Decontamination.
3. Under the supervision of the field facility lead, the field facility team will transfer the whole-water sample volume, if applicable, into laboratory sample containers as specified in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.

4. The field facility lead is responsible for the storage and shipment of samples to the laboratory in accordance with the procedures outlined in SOP NC-06 – Sample Custody and SOP NC-07 – Sample Packaging and Shipping.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and following standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify the information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

Quality assurance/quality control (QA/QC) samples, such as field blanks, will be collected at the frequency specified in the Phase 2 QAPP. If QA/QC samples are to be collected during an event, the field lead will provide the field team with the specific QA/QC sample collection details prior to the sampling event. Note that for samples collected into carboys, the sample volume for field duplicates will be split into the appropriate laboratory bottles during the field facility homogenizing and filtering process, detailed in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

Anchor QEA, 2014b. *Phase 2 Health and Safety Plan*. Appendix C of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014c. *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

Anchor QEA, 2014d. *Phase 2 Remedial Investigation Work Plan – Volume 2*. Draft. Remedial Investigation/Feasibility Study, Newtown Creek. August 2014.

Anchor QEA, 2014e. *Phase 2 Field Sampling and Analysis Plan – Volume 1*. Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 1*. Remedial Investigation/Feasibility Study, Newtown Creek. May 2014.

Anchor QEA, 2014f. *Phase 2 Quality Assurance Project Plan*. Appendix A of the *Phase 2 Remedial Investigation Work Plan*. Remedial Investigation/Feasibility Study, Newtown Creek. July 2014.

USEPA (U.S. Environmental Protection Agency), 1996. *Method 1669 Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Office of Water Engineering and Analysis Division. July 1996.

LIST OF ATTACHMENTS

Attachment 1 – Example Pump Time Table for Wet-Weather Water Pollution Control Plant Influent Sampling

ATTACHMENTS

Attachment 1
Example Pump Time Table for Wet-Weather Water Pollution Control Plant Influent Sampling

Calculated Pump Rate:		3 liters per minute		
Sampling Program:		Whole-water		
Storm Durations Sampled (hour):		4	6	8
Intervals Sampled:		16	24	32
Carboy fill order	Time pumped into each container during each 15-minute interval (seconds)	Container details		
1	16	8-hour storm – whole-water		
2	21	6-hour storm – whole-water		
3	31	4-hour storm – whole-water		

STANDARD OPERATING PROCEDURE NC-37 – POINT SOURCES SPLIT SAMPLE COLLECTION AND PROCESSING

STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT FORM

Project Number: 141037-01.01 Project Name: Newtown Creek RI/FS

My signature below certifies that I have read and understand the procedures specified in this Standard Operating Procedure.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of point sources split samples. Manual composite, sheetflow manual composite, dry-weather grab, grab composite, discrete total suspended solids (TSS), bulk-water, and Water Pollution Control Plant (WPCP) dry- and wet-weather influent split samples for chemistry may be collected for U.S. Environmental Protection Agency (USEPA), New York City Department of Environmental Protection (NYCDEP), and individual site owners in conjunction with the samples collected for the Remedial Investigation/Feasibility Study (RI/FS) for the Newtown Creek Study Area. The appropriate sample collection method for each sampling location is specified in the *Phase 2 Field Sampling and Analysis Plan – Volume 2* (Phase 2 FSAP Volume 2; Anchor QEA 2014a).

Procedures for split sample collection outlined in this SOP are expected to be followed. Sampling activities will be thoroughly recorded and documented on sample collection forms and in field notes, as specified in SOP NC-01 – Field Records. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Activity Log and on a Field Deviation Form (see SOP NC-01 – Field Records). Deviations may include modifications to the sampling methods or equipment based on field conditions.

HEALTH AND SAFETY WARNINGS

Health and safety issues for the work associated with this SOP, including physical and chemical hazards, are addressed in the *Phase 2 Health and Safety Plan* (Phase 2 HASP; Anchor QEA 2014b). The Phase 2 HASP will be followed during all activities conducted by Anchor QEA, LLC (Anchor QEA) personnel as part of the Newtown Creek RI/FS. A tailgate safety meeting will be conducted prior to sample collection at each sampling location and will include review of a sampling location-specific Activity Hazard Analysis (AHA).

In addition to the Phase 2 HASP, the *Phase 2 Health and Safety Plan – New York City Department of Environmental Protection Properties* (NYCDEP HASP; Anchor QEA 2014c) should be read by the sampling staff prior to sampling at locations owned by NYCDEP.

PERSONNEL QUALIFICATIONS

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP, the *Phase 2 Remedial Investigation Work Plan – Volume 2* Section 5.2.2 (Anchor QEA 2014d), the corresponding documents (i.e., Phase 2 FSAP Volume 2 [Section 10.2 and other SOPs referenced within this SOP] and Phase 2 HASP; Anchor QEA 2014a and 2014b, respectively), and the SOPs referenced within this SOP from the *Phase 2 Field Sampling and Analysis Plan – Volume 1* (Appendix B to the *Phase 2 Remedial Investigation Work Plan – Volume 1*; Anchor QEA 2014e). As noted above, the NYCDEP HASP should be read prior to sampling at locations owned by NYCDEP, including the WPCP (Anchor QEA 2014c). Field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

EQUIPMENT AND SUPPLIES

The following is a list of equipment that will be necessary to carry out the procedures contained in this SOP. Additional equipment may be required depending on field conditions. This equipment list assumes that the equipment for the associated sampling method will already be on site, and only includes the extra equipment needed to collect split samples.

Specific Equipment – Manual Composite, Sheetflow Manual Composite, or WPCP Influent Split Sampling

- Pre-labeled, 6.5-gallon, glass carboys for split samples (see location-specific sampling package for total number of carboys required per sampling location)
- Pre-labeled, laboratory-supplied sample containers for volatile organic compound (VOC) analysis for split samples
- Power supply (12-volt, deep-cycle battery)
- One or more pump apparatus (ISCO Model 6712 peristaltic pump or similar)
- Sample pickup and distribution tubing: Teflon-lined polyethylene with 0.38-inch inner diameter by 0.5-inch outer diameter
- Pump tubing: Silicone tubing with 0.38-inch inner diameter

- One or more strainers (ISCO stainless-steel or similar) for the tubing intake
- Zip ties and clamps to affix the pump tubing and strainer(s) to the pole
- Carboy harnesses
- Carboy coolers
- Ice

Specific Equipment – Dry-Weather Grab and Grab Composite Split Sampling

- Pre-labeled, laboratory-supplied sample containers for split samples
- If a pump is needed to collect the samples (at a subset of grab composite split sampling locations), the following equipment will be needed:
  - Power supply (12-volt, deep-cycle battery)
  - One or more pump apparatus (ISCO Model 6712 peristaltic pump or similar)
  - Sample pickup and distribution tubing: Teflon-lined polyethylene of 0.38-inch inner diameter by 0.5-inch outer diameter
  - Pump tubing: silicone tubing with 0.38-inch inner diameter
  - Zip ties and pipe clamps to affix the pump tubing and strainer to the pole
  - Strainer(s) (ISCO stainless-steel or similar) for the tubing intake
- 0.45-micrometer disposable capsule filters
- Coolers
- Ice

Specific Equipment – Discrete TSS Split Sampling

- Pre-labeled, laboratory-supplied TSS sample containers for split samples
- Coolers
- Ice

Specific Equipment – Bulk-Water Split Sampling

- Three pre-labeled, 6.5-gallon carboys for split samples
- Pre-labeled, laboratory-supplied sample containers
- Carboy harnesses
- Carboy coolers

- Funnel
- Ice

SPLIT SAMPLING PROCEDURES

The following split procedures assume that the pre-mobilization and pre-sampling procedures in the sampling method SOPs NC-23 through SOP NC-28 and SOP NC-36 will be followed.

The following steps will be completed by the field sampling team at the sampling location:

1. For composite sampling locations, where manual composite, sheetflow manual composite, WPCP influent, and discrete TSS sampling methods will be used:
   a. If a pole is to be used, zip-tie the split sample tubing and strainer, if applicable, to the pole at the same depth (or depths) as the primary tubing. If multiple depths of tubing are installed for the primary sample collection, the split sampling setup will also have multiple sample tubes installed to the same depths. If a pole is not to be used (e.g., at the sheetflow manual composite sampling locations), the primary and split sample tubing will be zip-tied together so that the intakes are adjacent to one another. Between one intake tube and three intake tubes set at different depths in the flow will be installed for split sample collection, consistent with the tubing setup for the primary samples. The number of tubes and depth of installation will be specified in the location-specific sampling package.
   b. The pumps for primary and split sample collection should each be calibrated at the same flow rate and flow time per interval per sample container. For the whole-water carboys, the primary and split sample carboys should be filled in the same order and at the same time. Therefore, each of the primary and split carboys will be filled at the same time with sample volume collected from the same depth. For example, sample volume will be pumped into the primary sample 4-hour composite whole-water carboy at the same time and pump rate as the split sample 4-hour composite whole-water carboy. This will be continued until all aliquots for that sampling interval have been pumped. For the WPCP influent sampling location where the ISCO pump may be

programmed, the split sample pump should be programmed to pump the same volume at the same time as the primary sample pump.

c. If split discrete TSS samples are being collected, collect the split samples using the split sample pump at the same time as the primary TSS samples are collected using the primary sample pump, in a similar manner as the whole-water carboys.
d. If applicable, pump the sample volume into the particulate/dissolved primary sample and split sample containers in the same manner as the whole-water primary sample and split sample carboys.
e. Grab samples for VOC analysis will be collected at the frequency described in each sampling method SOP. Three volatile organic analysis vials will be filled for each grab sample. Similar to the manner that the carboys are filled, fill the split sample VOC containers at the same time as the primary sample VOC containers, with the same pump intake depth.
f. Prior to each sampling interval, purge the split sample tubing for 1 minute by pumping in reverse for approximately 1 minute.
g. If there is more than one sample intake depth (applicable to whole-water manual composite sampling locations only), the sample tubing intake used for each sampling interval will rotate between each sampling interval, in the same order and manner as described in SOP NC-23 – Point Sources Whole-Water Manual Composite Sampling.

2. For grab sampling locations, including dry-weather grab and grab composite sampling:
   a. When a pump is to be used (e.g., the Motiva Brooklyn Terminal sampling location), the split sample tubing and strainer, if applicable, will be zip-tied to the sample pole to the same depth as the primary sample tubing. Similar to the manual composite split sampling procedures listed above, the primary and split pumps will be calibrated to pump at the same rate. Pump the sample volume into the split sampling bottles using the split sampling pump at the same time as the primary sample pump is used to pump into the primary sample bottles. The analytical bottles will be filled in the same order for the primary and split samples.

   b. When using a port or other valve to fill the split sample bottles, the primary and split volume cannot be collected simultaneously. Instead, fill the split laboratory bottles in sequence with the primary laboratory bottles. When possible, the primary and split sampling bottles for the same analyses should be filled one after the other. For example, the polycyclic aromatic hydrocarbon (PAH) split sample bottle will ideally be collected immediately after collecting the PAH primary sample bottle, and so on. For the grab composite sampling, the volume will be filled over three intervals during the sampling event, but the same procedures of filling the bottles in series should be followed.
3. For bulk-water sampling:
   a. There will be one bulk-water pump and one set of bulk-water tubing, so bulk-water split samples will be collected in series, similar to the grab sampling split sample collection procedure. Each carboy or sampling container will be filled by one-third during each sample collection interval. Fill the split carboys and sampling containers immediately after filling the primary sample carboys and sampling containers.
4. Following sample collection, the split samples that have not been collected directly into laboratory bottles and are not to be submitted to the laboratory in carboys will be processed in the same manner as the primary samples. Under the supervision of the field facility lead, the field facility team will transfer the split whole-water sample volume, if applicable, into split laboratory sample containers in the manner specified in SOP NC-30 – Point Sources Field Facility Homogenizing and Filtering Procedures. The laboratory bottles for the split sample will be filled in the same order as the laboratory bottles for the primary sample. If there is sufficient excess volume collected in a primary sample carboy, primary and split laboratory bottles may be filled from the same carboy, with the bottles for the same analyses filled one after the other (e.g., primary sample PAH laboratory bottle followed by split sample PAH laboratory bottle, and so on).

QUALITY ASSURANCE/QUALITY CONTROL

Quality control procedures will consist of following standard instrument operation procedures for making in situ water quality measurements and standard practices for the collection of water quality samples. Sampling field forms will be double-checked by the field team staff to verify information is correct. It is the responsibility of the point sources field lead to periodically check to ensure procedures are in conformance with those stated in this SOP.

REFERENCES

Anchor QEA (Anchor QEA, LLC), 2014a. *Phase 2 Field Sampling and Analysis Plan – Volume 2*. Draft Appendix B of the *Phase 2 Remedial Investigation Work Plan – Volume 2*. Remedial Investigation/Feasibility Study, Newtown Creek. September 2014.

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